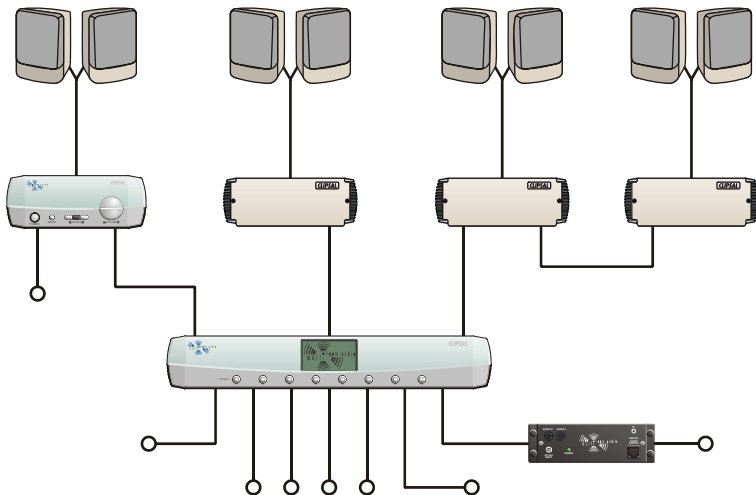




Multi Room Audio System

Installation Instructions

560011	Distribution Unit
560125D	Desktop Amplifier
560125R	Remote Amplifier
560884	Matrix Switcher



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V1.0 Dec 2005

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1.0 Product Range

Catalogue Number	Description
560011 560125D 560125R 560884	Multi Room Audio Distribution Unit Multi Room Audio Desktop Amplifier Multi Room Audio Remote Amplifier Multi Room Audio Matrix Switcher
5600P24/500AU 5600P24/3750AU	MRA Distribution Unit Power Supply MRA Amplifier Power Supply Unit

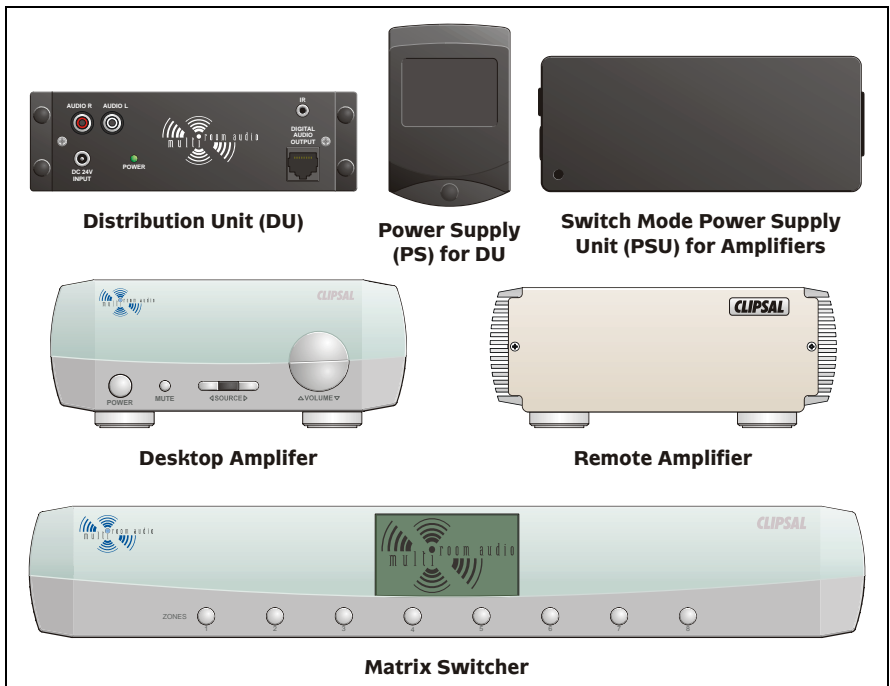


Figure 1 – Multi Room Audio product identification

2.0 Important Notes

- The Matrix Switcher has a built-in C-Bus power supply. Take this into account when determining the power supply requirement of the C-Bus network.
- Avoid laying analogue or digital audio cable alongside mains cable, to minimise EMI interference and signal disruption.
- Do not cover or block the vents on the Matrix Switcher enclosure.
- The Matrix Switcher and Amplifiers of a particular Multi Room Audio (MRA) system must be connected to the same C-Bus network. Multiple MRA systems may reside on separate C-Bus networks.
- Only use a Clipsal approved power supply to power an MRA Amplifier or Distribution Unit. Failure to do so may damage the unit, and void the warranty.
- Units must be installed in accordance with local authority guidelines.
- The digital audio outputs must only be used with MRA Amplifiers.

3.0 System Overview

The Multi Room Audio Matrix Switcher and Amplifiers provide a C-Bus enabled audio distribution system.

The Matrix Switcher is installed in a room together with audio sources such as a radio tuner, CD player and digital TV set top box. Connections are made to the Amplifiers and to C-Bus.

Amplifiers are installed in each room where audio is to be distributed. They are connected to speakers and the C-Bus network. Using C-Bus switches (or the controls on a Desktop Amplifier), each Amplifier can select different audio sources and adjust the volume, bass and treble.

The Distribution Unit allows a single stereo audio input to be added to the digital input of the Matrix Switcher. It also allows one distributable stereo audio input to be plugged into the Amplifiers when no Matrix Switcher is used (when Amplifiers are used in stand-alone mode).

A typical Multi Room Audio system distributes up to four stereo analogue audio inputs (five if a Distribution Unit is used), and one stereo optical digital audio input. These inputs are distributed to up to 8 zones (each consisting of one or more Amplifiers). A special mono audio input can be

used to broadcast a message to all zones. Additionally each Amplifier is capable of accepting a local stereo audio input, providing up to seven stereo audio channels for each Amplifier.

By adding infrared (IR) targets and emitters to the system, Amplifiers can distribute infrared remote control signals to audio source equipment via the Matrix Switcher. Additionally two buttons on a C-Bus wall switch can be configured to send infrared commands to the audio source equipment; commands which adapt according to which source is selected.

4.0 System Configurations

A Multi Room Audio system can be installed in either a matrix or standalone configuration.

4.1 Matrix

A matrix configuration (Figure 2) consists of a Matrix Switcher which is connected to one or more Multi Room Audio Amplifiers. An Amplifier connected to each zone can select from up to six stereo audio sources plus its local stereo audio input. The audio broadcast and annunciation features of the Matrix Switcher can be utilised in this configuration.

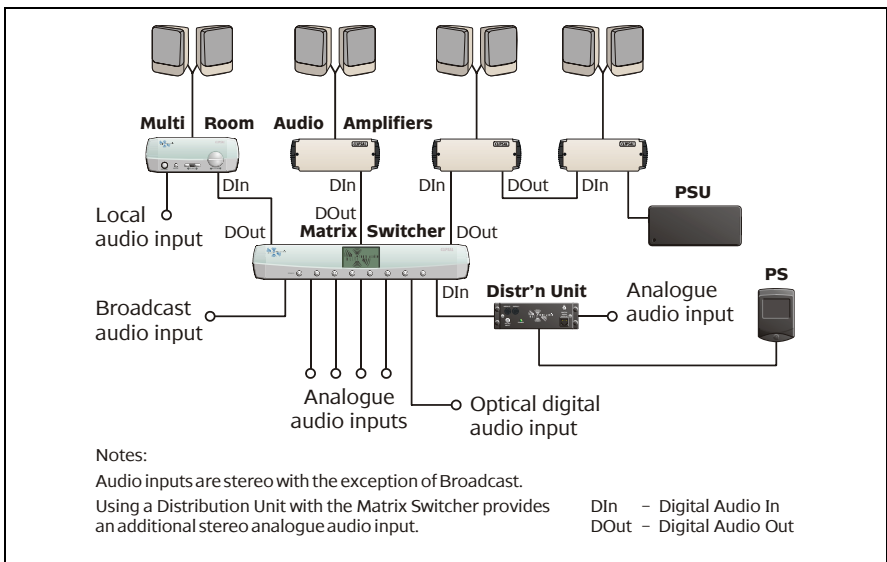


Figure 2 – The matrix configuration

4.2 Standalone

In a standalone configuration a stereo audio source is connected to the input of a Distribution Unit. The output of the Distribution Unit is connected to the digital input of each Amplifier. RJ45 splitters are used to connect all digital inputs to a common Cat-5 cable run. A Matrix Switcher is not used. Up to eight Amplifiers can be connected in this mode using a total cable length of up to 45 m. This is illustrated in Figure 3. Each Amplifier can select between the single distributed stereo audio source and its local stereo audio input.

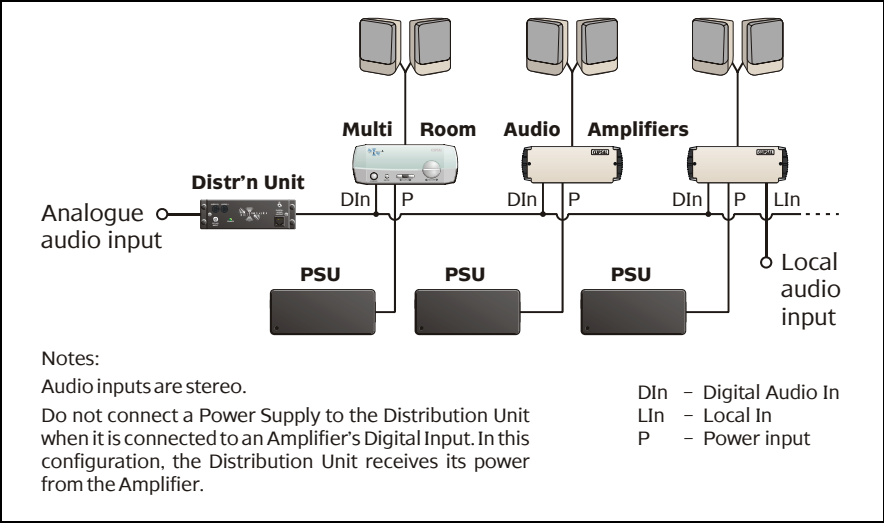


Figure 3 – Standalone configuration

5.0 Installation and Connection

The most time consuming stage of installing a typical Multi Room Audio system is likely to be cabling and wiring. To ensure successful wiring and connection of a Multi Room Audio system:

- Plan – Consider the way the system will be used and create drawings to indicate where terminations will be located.
- Organise – Use wall plate terminations to connect to the Matrix Switcher, Amplifiers and speakers, as well as any local or mono broadcast inputs or headphone outputs. Label the terminations, especially the C-Bus and digital audio sockets which are both RJ45. Consider using colour coded sockets.
- Use appropriate cable.

5.1 Location and Mounting

The Multi Room Audio Matrix Switcher, Distribution Unit, Amplifiers and their associated Power Supplies are suitable for indoor use in moderate to tropical climates. All units must be protected from excessive heat, dampness and liquids.

Matrix Switcher

It is recommended that the Matrix Switcher be located in a central location with the audio source equipment (such as in a cabinet in the lounge room).

Place the Matrix Switcher on a flat surface. Do not remove the feet from the base of the unit as they provide necessary air space. Air must be allowed to flow through vents on the top and base of the Matrix Switcher (by natural convection). Ensure that at least 15 mm of free space is left above the unit, as well as 50 mm at the front of the unit and 75 mm at the rear. This is illustrated in Figure 4.

Ensure that the user will have access to the mains inlet socket after the unit has been installed.

Amplifiers and Switch Mode Power Supply

Suitable locations for Amplifiers may include built-in robes, a pantry or in a ceiling space which is not subjected to high temperature. Alternatively Amplifiers may be located centrally with the Matrix Switcher.

Air must be allowed to flow against the fins on the sides of the Amplifiers (by natural convection). Ensure that at least 50 mm of free space is left at the rear and at each side of the Amplifiers. In addition, leave at least 10 mm of free space at the front of the Desktop Amplifier.

The Switch Mode Power Supply for the Amplifiers has a vent at one end. Leave at least 50 mm of free space in front of this vent. Refer to Figure 5.

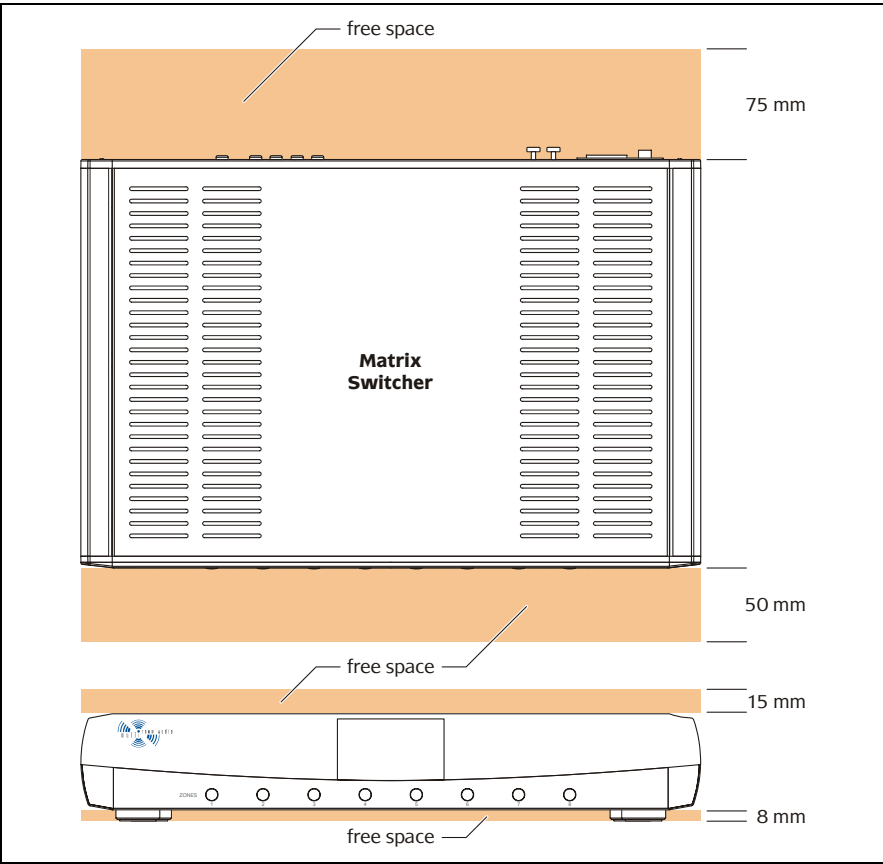


Figure 4 – Clearance must be left around the Matrix Switcher

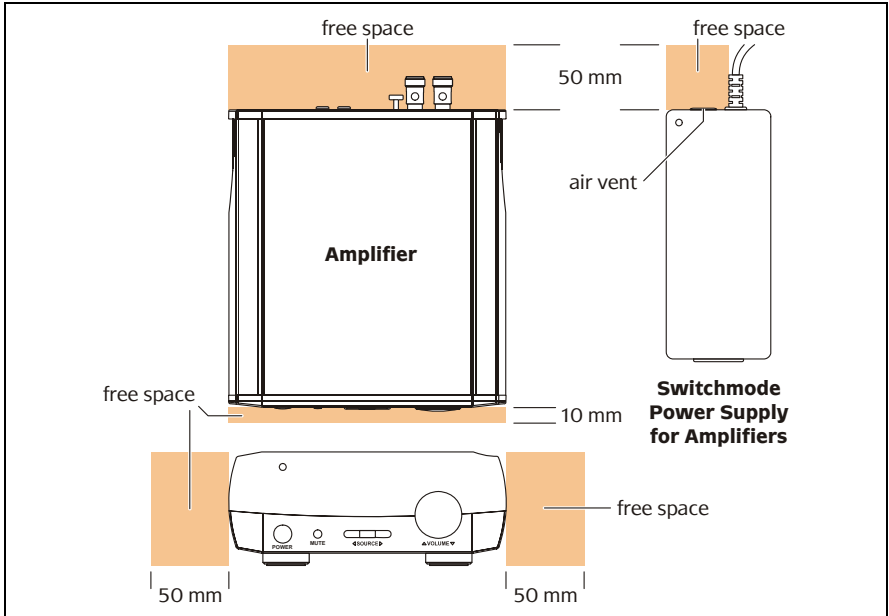


Figure 5 – Clearance must be left around Amplifiers and their Power Supplies

5.2 An Example System

In a Multi Room Audio (MRA) installation, you can locate an Amplifier and speakers in each room where audio is required. You would then run RJ45 cable across the building from the Matrix Switcher to each Amplifier, and run shorter lengths of cable from the Amplifiers to the speakers. Alternatively, you can locate all Amplifiers in a central location and run the speaker cables across the building. In the example used to illustrate an MRA system installation, a combination of these methods is used.

The example system consists of one Matrix Switcher, five Remote Amplifiers and one Desktop Amplifier. Three of the Remote Amplifiers are collocated with the Matrix Switcher. One Remote Amplifier is located on a shelf in the Garage and another in a built-in robe (BIR). The Desktop Amplifier is located on a desk in Bedroom 2 (BR2). Speakers are mounted on walls using appropriate brackets. Wall plates are used in the bedrooms and family room to provide local inputs. These can be used to connect to the audio output of a personal computer (PC) or portable audio player.

On the following pages, diagrams are used to illustrate the C-Bus, speaker, digital audio, IR target and shielded audio stages of the installation.

5.3 C-Bus Cabling

The Amplifiers and Matrix Switcher in a Multi Room Audio system must be connected to a common C-Bus network. Use Cat-5 Unshielded Twisted Pair (UTP) C-Bus cable, and appropriately wired RJ45 plugs and wall plates. Pinouts and cable conductor assignments are provided in Figure 6 and Table 1. Label wall plates to differentiate between other RJ45 connection types (such as Digital Audio and Ethernet). If colour coding, it is suggested you use pink for C-Bus, green for Digital Audio and blue for Ethernet.

Use a C-Bus wall switch (such as Ulti Saturn, Neo or Reflection) to control each zone of the Multi Room Audio system. Switches with Dynamic Labelling Technology (DLT) can be configured to provide visual feedback of selected audio sources. Typically, an individual C-Bus wall switch is used to control both lighting and audio.

In the example installation in Figure 7, Ulti Saturn and Neo wall switches are used in BR2 and BR3 respectively (zones 2 and 3), and DLT wall switches are used to control the remaining Multi Room Audio zones.

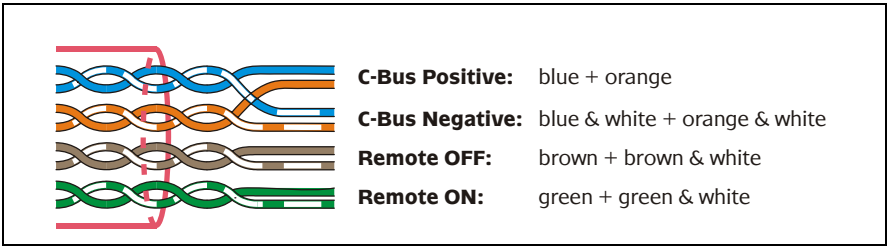


Figure 6 – C-Bus cable conductor assignments

	Pin	C-Bus Connection	Colour
	1	Remote ON	green & white
	2	Remote ON	green
	3	C-Bus Negative (-)	orange & white
	4	C-Bus Positive (+)	blue
	5	C-Bus Negative (-)	blue & white
	6	C-Bus Positive (+)	orange
	7	Remote OFF	brown & white
	8	Remote OFF	brown

Table 1 – RJ45 sockets and C-Bus Pinouts

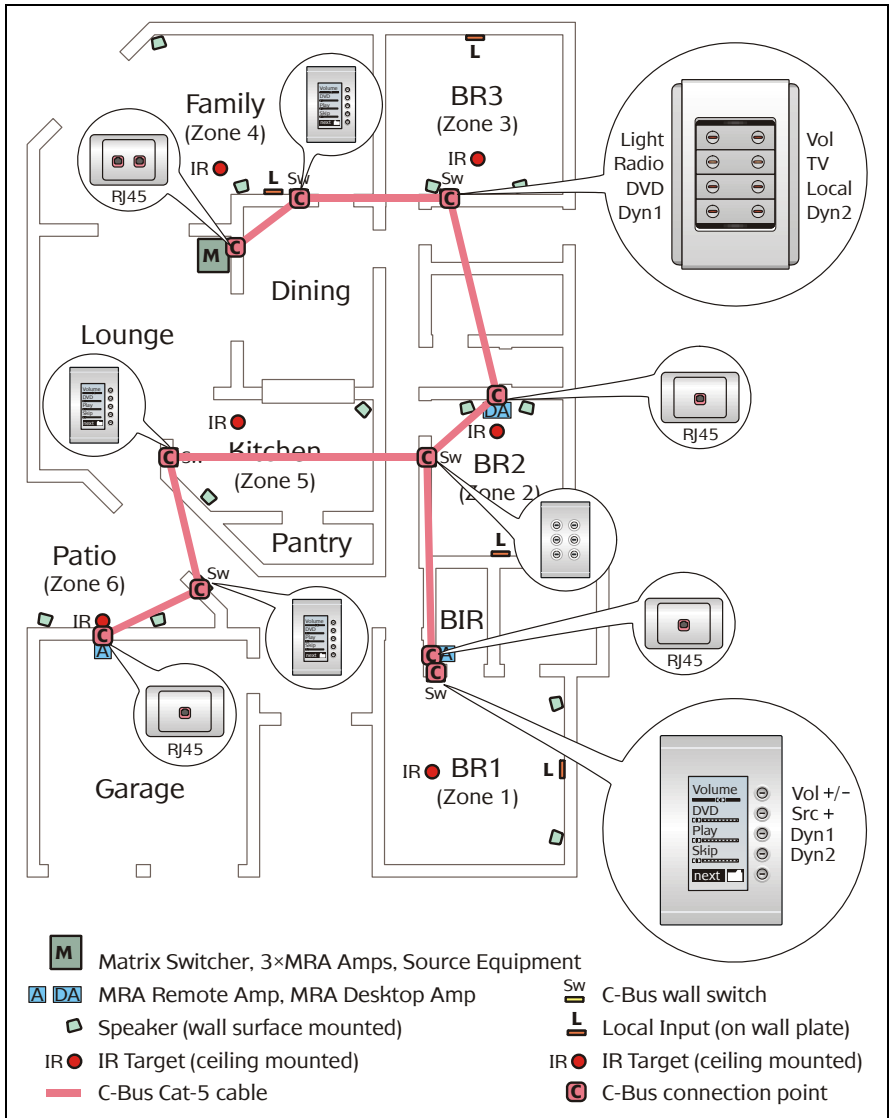


Figure 7 – C-Bus cabling and termination

5.4 Speaker Cabling

Depending on the installation, speakers may be mounted on a wall using brackets, or flush mounted on a wall or ceiling. When speakers are mounted on brackets, it is recommended that an RCA wall plate is installed adjacent to each speaker.

Spring-release or screw binding post wall plates are used to connect to speaker outputs of the Amplifiers.

Use low impedance speaker cable to connect the binding post (Amplifier) wall plates to the RCA (speaker) wall plates. This is especially important with long cable runs.

Figure 8 illustrates how an RCA wall plate is used to connect a speaker. This is ideal for speakers which have been mounted on walls using brackets, as in the example installation in Figure 9.

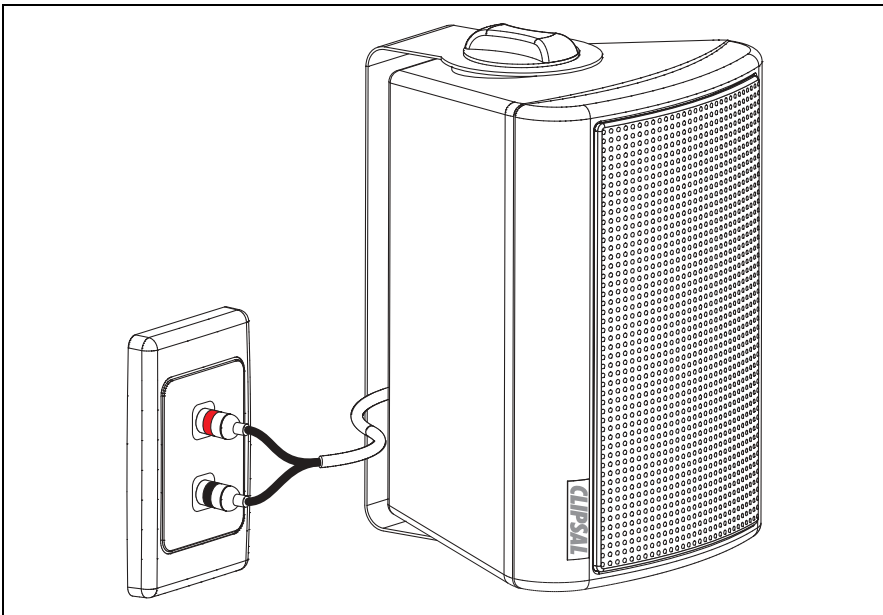


Figure 8 – An RCA wall plate makes a practical speaker connection point

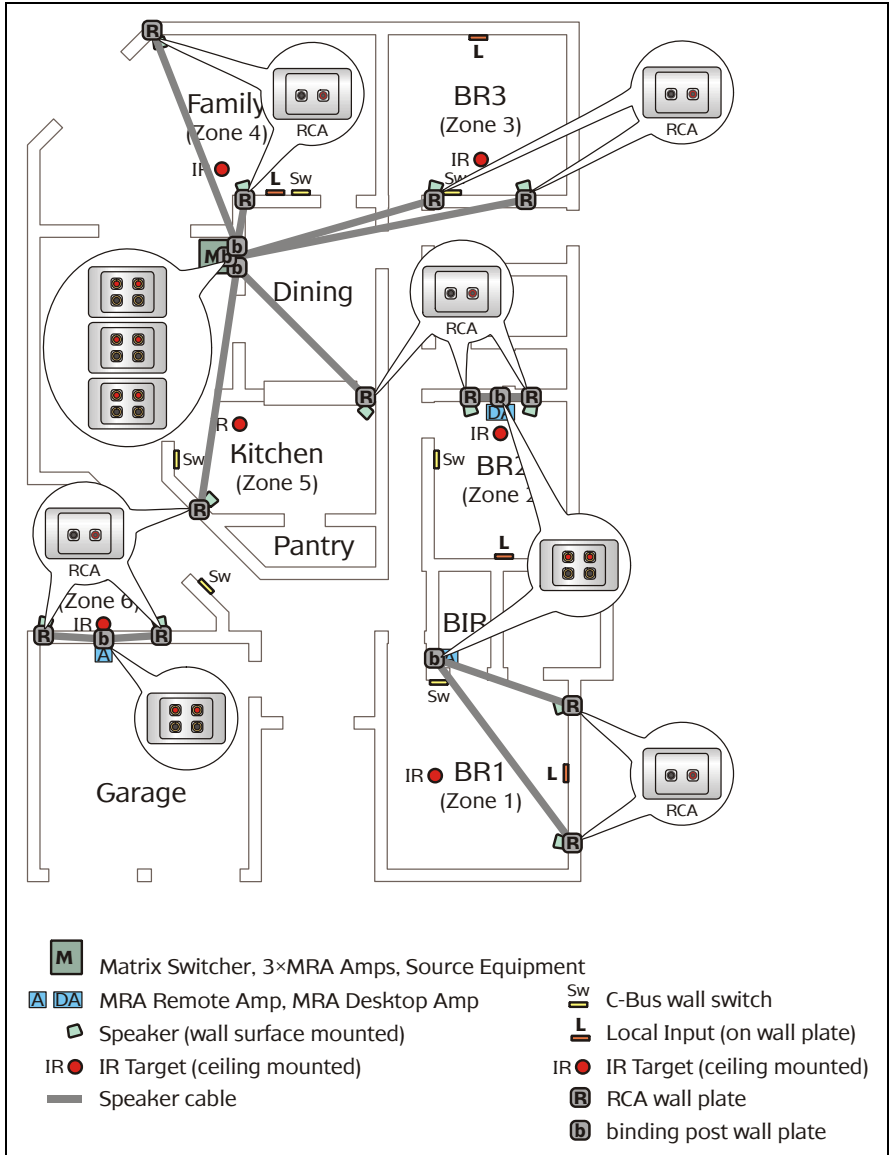


Figure 9 – Speaker cabling and termination

5.5 Digital Audio Cabling

A digital audio cable must be connected between each Amplifier and the Matrix Switcher. Use Cat-5 Unshielded Twisted Pair (UTP) data cable, and appropriately wired RJ45 plugs and wall plates.

Since Cat-5 cable may be used for several purposes within the same installation, it is recommended you use green cable for digital audio connections, pink for C-Bus and blue for Ethernet. Wall plates should be labelled to differentiate between the various RJ45 connection types. Colour coding of sockets is recommended.

Avoid laying digital audio cable alongside mains cable, as electro-magnetic interference (EMI) can disrupt the signal. An individual Cat-5 cable which connects a digital audio output to an input should not exceed 45 metres. This is illustrated in Figure 10.

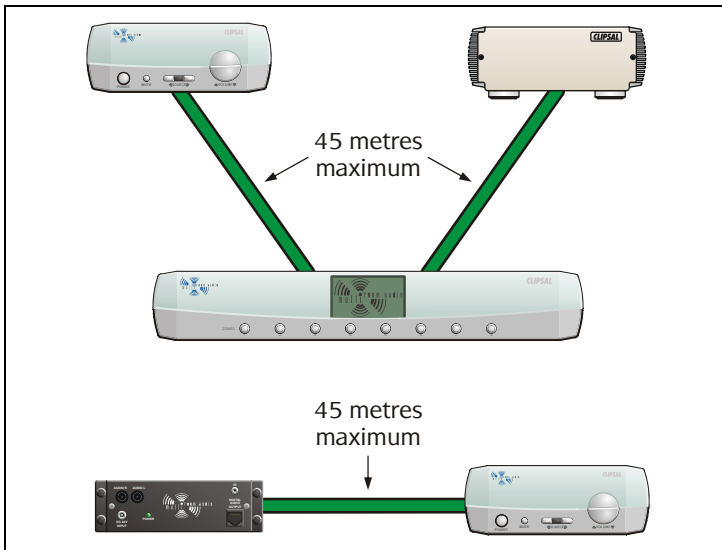


Figure 10 – Maximum digital audio cable length

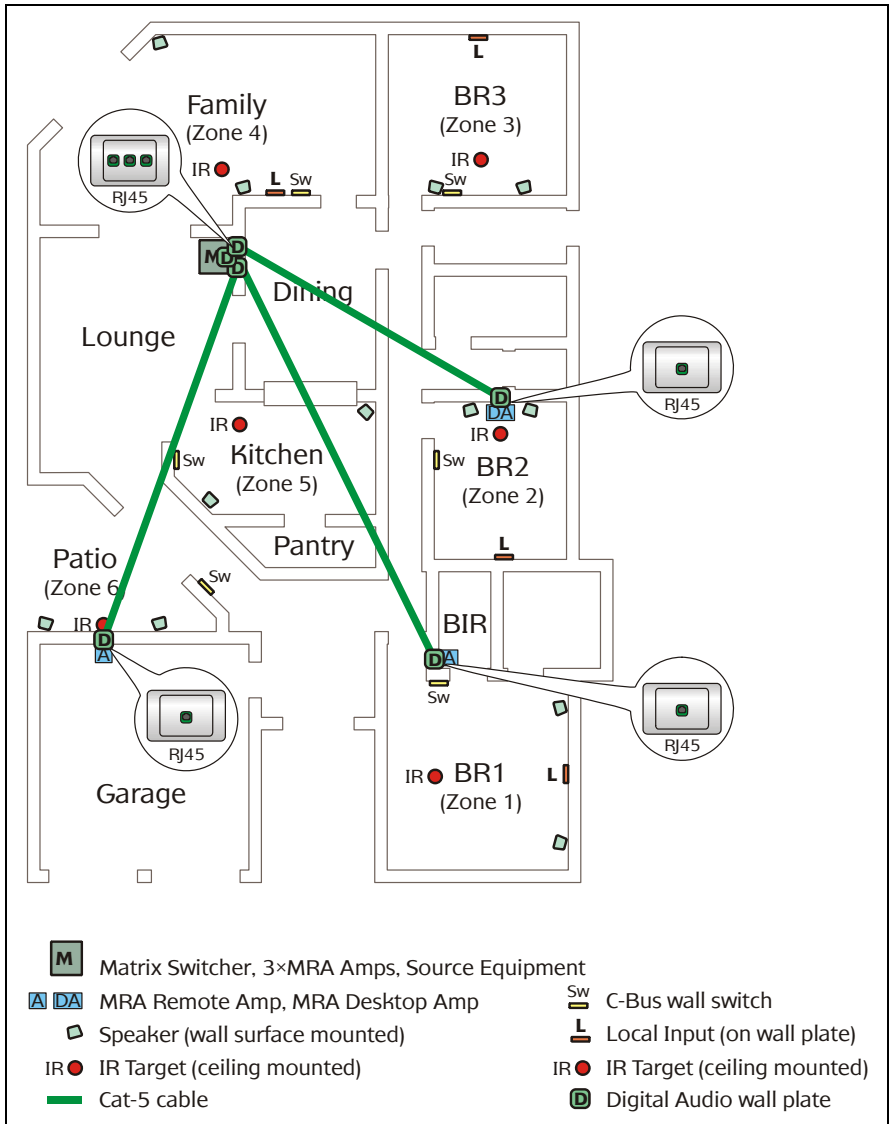


Figure 11 – Digital audio cabling and termination

5.6 IR Target Cabling

An infrared (IR) target can be connected to the green Phoenix socket on the rear of each Amplifier. This allows an IR remote control to operate audio source equipment which is fitted with IR emitters connected to the Matrix Switcher. Figure 12 shows two methods of connecting an IR target to an Amplifier.

A suitable IR target is the Clipsal 8050TT Tube Target mounted on a ceiling or wall (optionally via a wall plate). Extend the cable if required and wire to a 3.5 mm stereo socket on a wall plate adjacent to the Amplifier. Up to 45 m of total cable may be used between a target and the Matrix Switcher (or Distribution Unit in standalone mode). Create a lead to connect the Amplifier IR input to the 3.5 mm wall plate socket.

A Clipsal 8050ST Shelf Top Target can be mounted on top of a Desktop Amplifier and plugged directly into the IR input on its rear panel.



IR signals received by external IR targets cannot directly control the Amplifiers. Such control is accomplished via the IR receiver built into the front panel of the Desktop Amplifier.

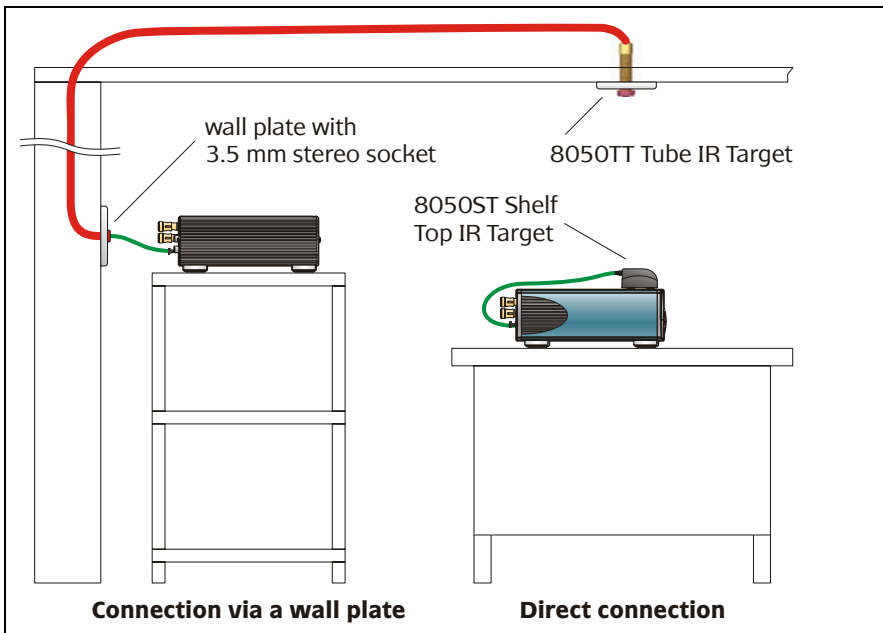


Figure 12 – Connecting an IR target to an Amplifier

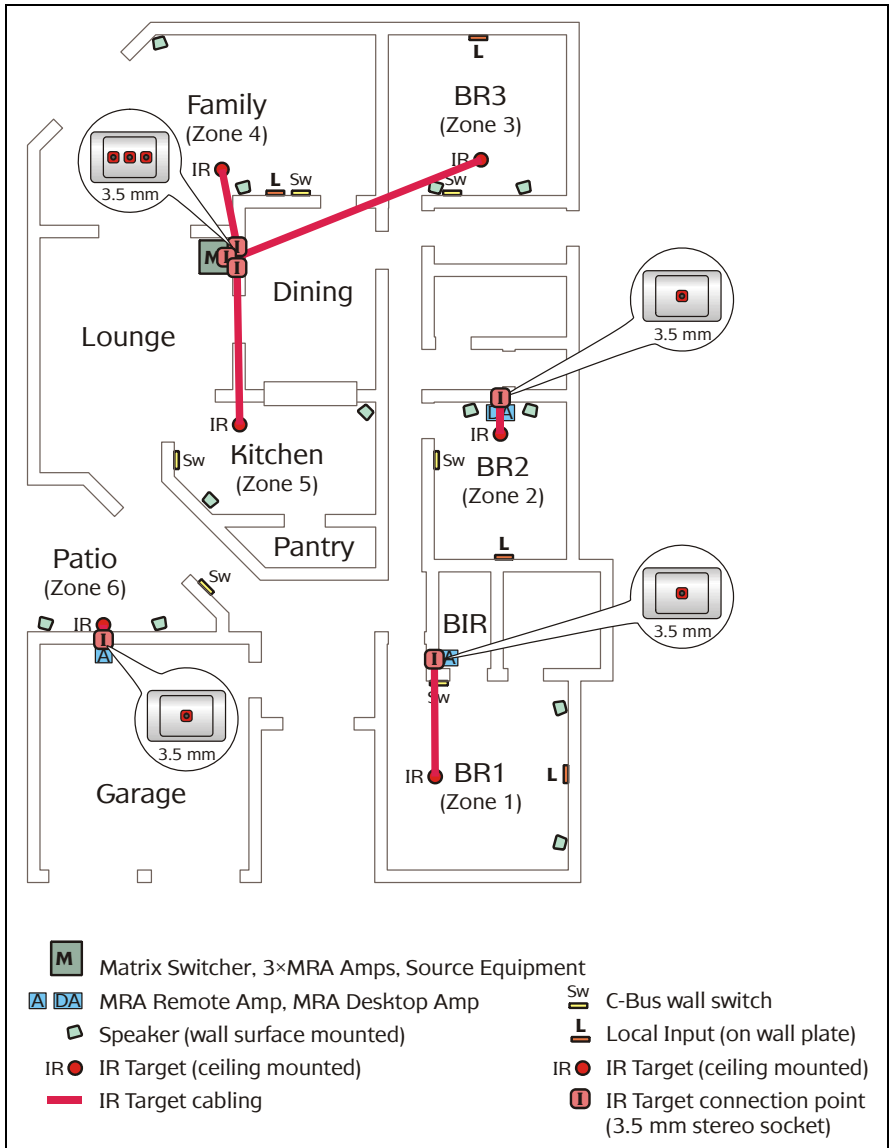


Figure 13 – IR target cabling and termination

The example installation in Figure 13 uses ceiling mounted Clipsal 8050TT Tube Targets for Remote and Desktop Amplifiers.

5.7 Shielded Audio Cabling

Multi Room Audio Amplifiers have line level local audio inputs (LOCAL IN), which can be used to play audio from a locally connected music player or PC. Amplifiers also have volume affected line level audio outputs (ZONE OUT) which can be connected to other audio equipment. The Desktop Amplifier has a headphone output. These inputs and outputs should be cabled and terminated if they are to be utilised.

It is recommended that wall plates with appropriate audio sockets be used to provide input and output connection points to the Amplifier. Use RCA sockets at the Amplifier end for local inputs and line outputs. Use 3.5 mm stereo sockets at the other end to provide the connection points for external audio equipment. Use 3.5 mm stereo sockets for headphone connections.

When installing audio cable:

- wire wall plates with suitably shielded stereo audio cable
- avoid laying audio cable alongside mains cable to minimise EMI pickup
- do not earth audio ground terminals.

Cabling and wall plate requirements for the example installation are illustrated in Figure 14.

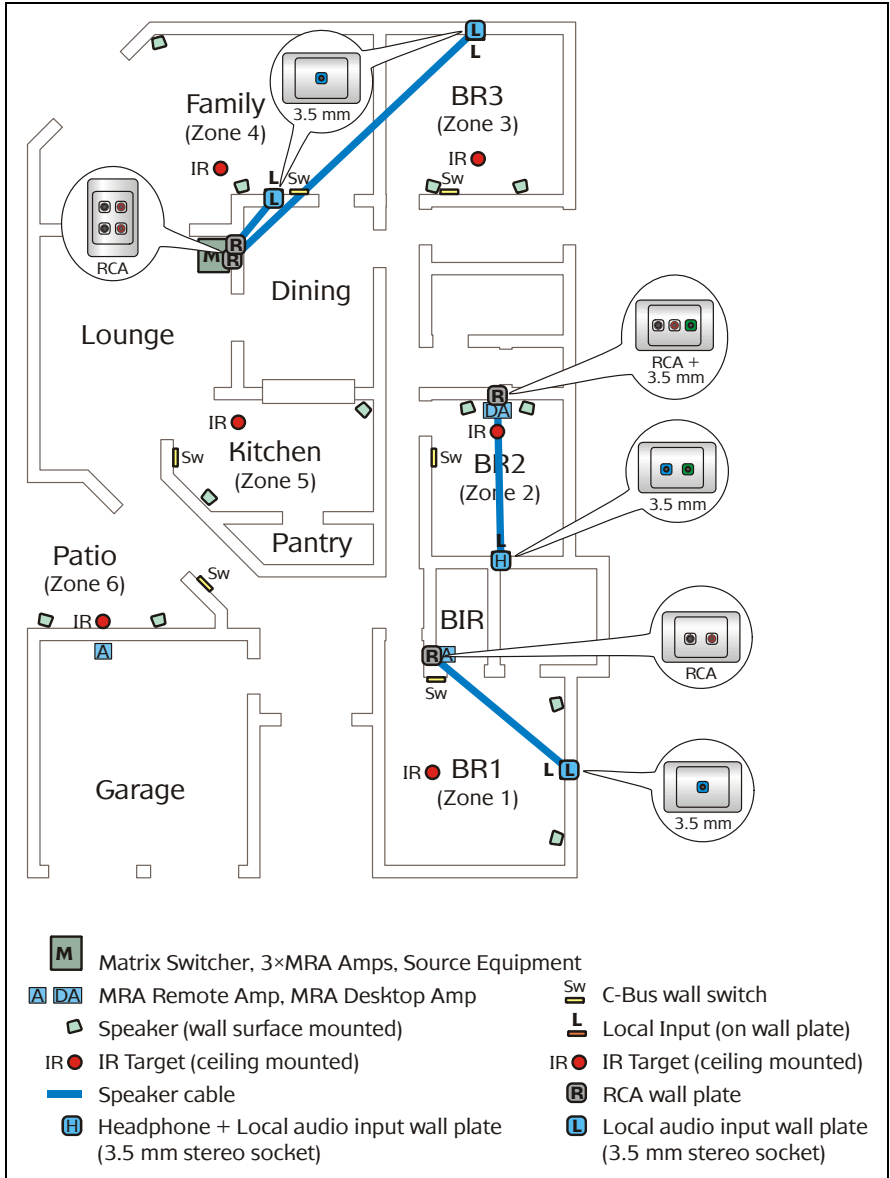


Figure 14 – Shielded audio (local input/headphone output) cabling & termination

5.8 Connecting Multi Room Audio Units

Once wall plate connections have been installed and cabled and speakers have been connected, you are ready to connect the Multi Room Audio Amplifiers and Matrix Switcher.

Figures 15 to 17 show the connection of Amplifiers for zones 1, 2 and 6 of the example system. Figure 18 shows the connection of Amplifiers for zones 3, 4 and 5 (which are centrally located), and for the Matrix Switcher.

Unit connections are identified on Page 53. Descriptions of the front panels are provided in the Amplifier and Matrix Switcher User's Guides.

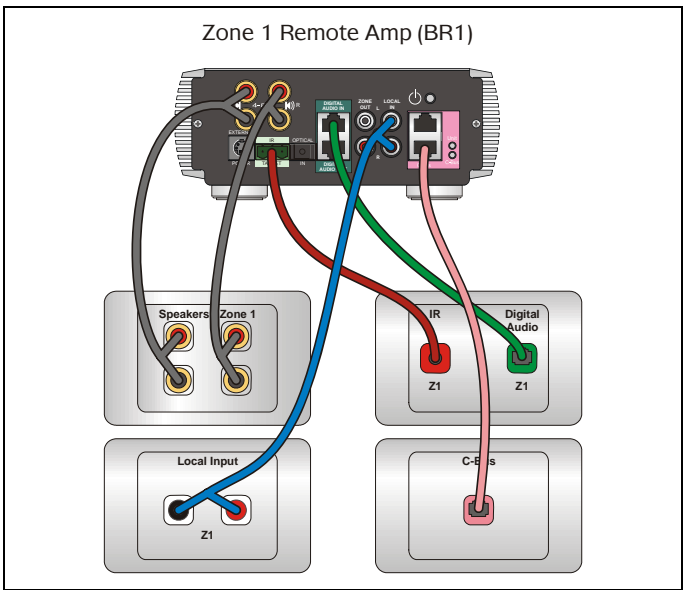


Figure 15 – Zone 1 Amplifier connections

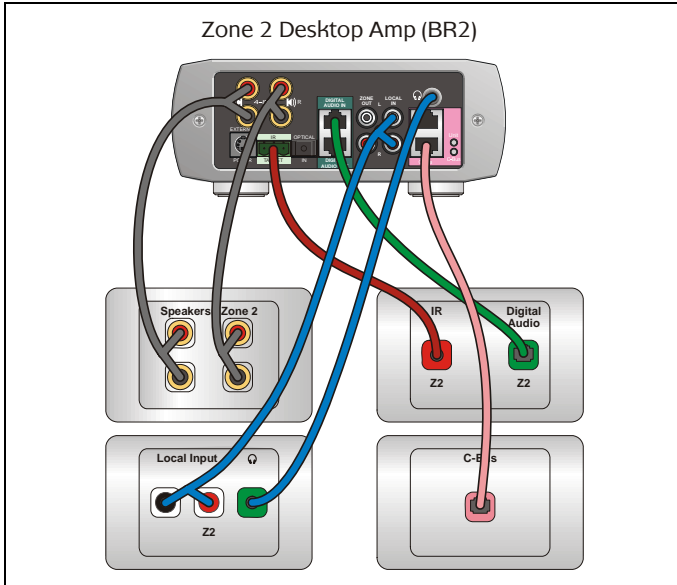


Figure 16 – Zone 2 Desktop Amplifier connections

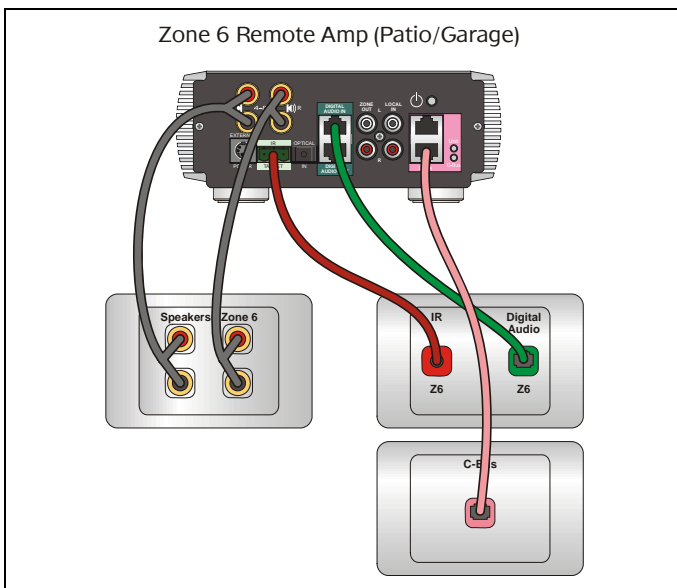


Figure 17 – Zone 6 Amplifier connections

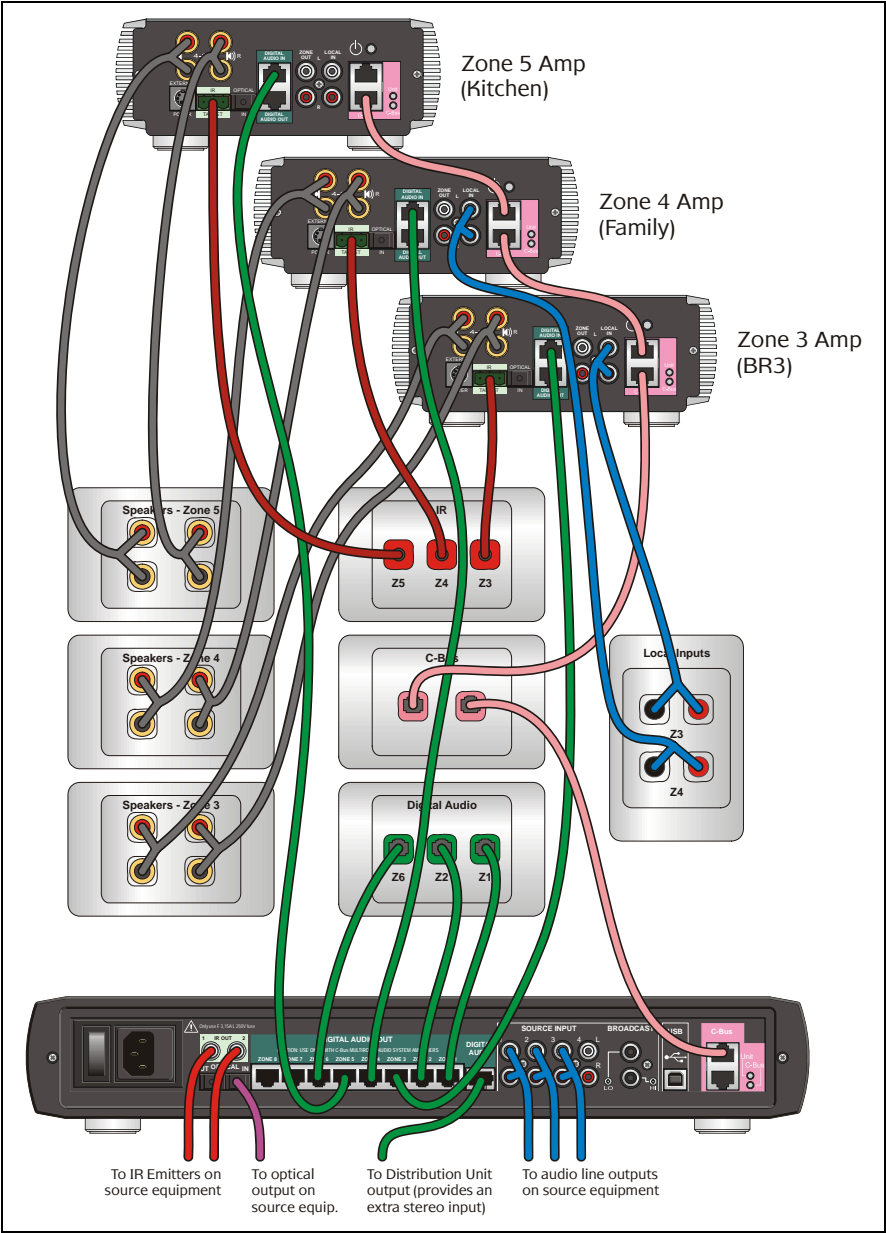


Figure 18 – Matrix Switcher and Zone 3 to 5 Amplifier connections

6.0 C-Bus System Clock

The Multi Room Audio Matrix Switcher and Amplifiers incorporate a software selectable C-Bus system clock. The system clock is used to synchronise data communication over a C-Bus network. At least one active C-Bus system clock is required on each C-Bus network for successful communication. No more than three units on any C-Bus network should have clock circuitry enabled, so this option is normally disabled using the C-Bus Toolkit software.

If a system clock is required, it can be enabled when editing the unit in the C-Bus Toolkit software.

7.0 C-Bus Network Burden

The Multi Room Audio Matrix Switcher and Amplifiers incorporate a software selectable network burden. The network burden can be enabled when editing the unit in the C-Bus Toolkit software, but only if the C-Bus system clock is also enabled.

One network burden is normally required to ensure correct operation of each C-Bus network. The Network window of a C-Bus Toolkit project provides a summary of a C-Bus network according to the units added to the Database. This can be helpful in determining how many burdens are required on a particular network.

8.0 C-Bus Power Requirements

The Matrix Switcher has a built-in C-Bus Power Supply which provides 330 mA to the C-Bus network. Multi Room Audio Amplifiers draw 22 mA from the C-Bus network.

The Matrix Switcher supplies enough C-Bus power for at least seven Multi Room Audio Amplifiers and seven C-Bus wall switches (such as the Ulti Saturn or DLT).

The Distribution Unit does not connect to C-Bus and therefore does not impact on the power requirements of a C-Bus network.

The Network window of a C-Bus Toolkit project provides a summary of a C-Bus network according to the units added to the Database. This can be helpful in determining the power supply requirements of a particular network.

9.0 Power Surges

External power surge protection devices should be used to enhance system immunity to power surges. It is strongly recommended that overvoltage protection equipment such as the Clipsal 970 Series be installed at the switchboard.

10.0 Programming and Setup

Once a Multi Room Audio (MRA) system has been installed, it must be configured using the C-Bus Toolkit software and the Multi Room Audio Rapid Programming Application (MARPA).

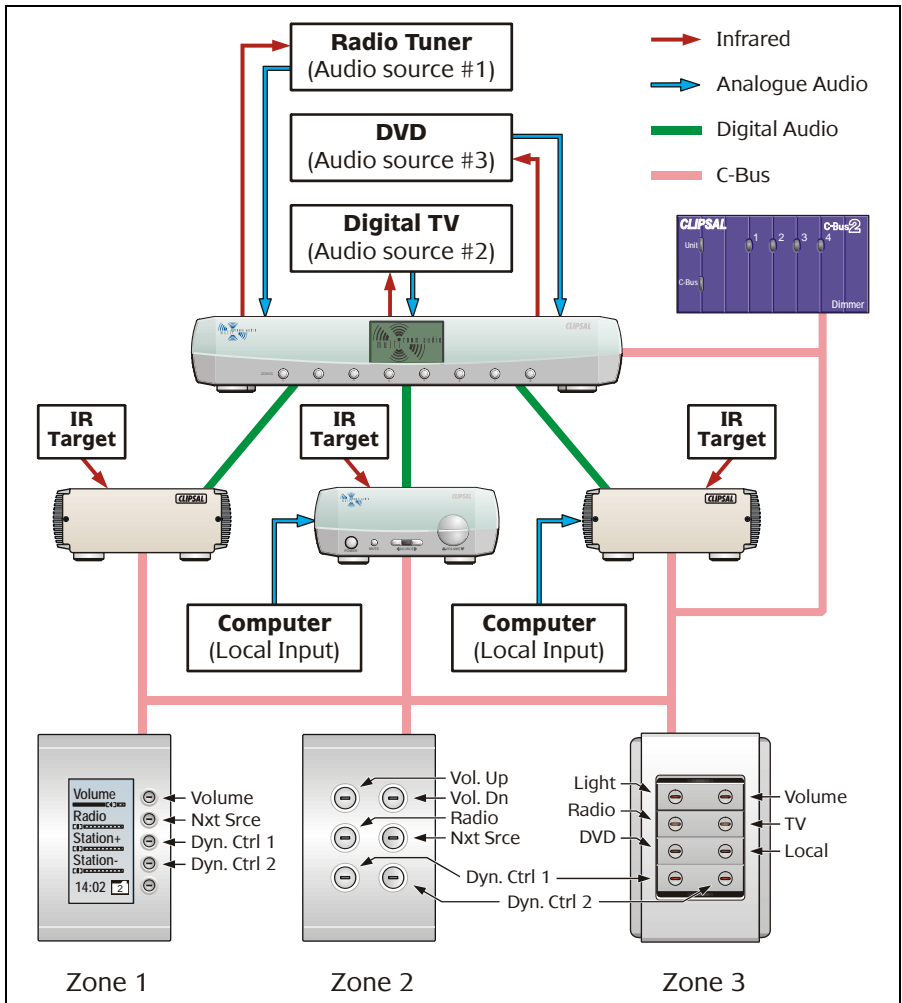


Figure 19 – Example system to be configured by software

It is highly recommended that you complete a C-Bus Training Course before configuring a Clipsal Multi Room Audio system. Sections 10.1 and 10.2 take you through the configuration process. These sections assume you are familiar with the C-Bus Toolkit software. They use the example system shown in Figure 19. This system consists of three zones and uses the following units (all on the same C-Bus network):

- 1 × Matrix Switcher
- 2 × Remote Amplifiers
- 1 × Desktop Amplifier
- 1 × Ulti Saturn DLT wall switch
- 1 × 6 button Ulti Saturn wall switch
- 1 × 8 button Neo wall switch
- 1 × radio tuner (audio source #1)
- 1 × digital TV set top box (audio source #2)
- 1 × DVD player (audio source #3)
- 1 × 4 Channel Dimmer.

10.1 C-Bus Toolkit

C-Bus programming is accomplished using the C-Bus Toolkit software. It involves:

- creating a C-Bus project with a Group Address structure which is used by MRA Amplifiers and the MARPA software
 - enabling a C-Bus system clock and burden in the Matrix Switcher (if required)
 - configuring each MRA Amplifier so it can be controlled by one or more C-Bus wall switches.
-
- 1) Start Toolkit, and create a new C-Bus project and network for the MRA system. If a project and network already exist (such as when you are adding to an existing C-Bus network), open that project and network.
 - 2) Decide which Application you will use for the MRA system. You may create a unique Application (such as “Lighting/Audio” Application Address 55). However, if you use C-Bus wall switches to control both lights and audio, both need to use the same Application Address. In this case it may be best to use the default “Lighting” Application Address 56.

3) Create the Group Addresses. These are used to associate buttons on wall switches or a touch screen with Amplifier control functions such as volume and source selection. For each Amplifier, create a Group Address for each of the following that will be controlled from a C-Bus device:

- Volume
- Bass
- Treble
- Next Source
- Previous Source
- Absolute Source (used in combination with a selector)
- Dynamic 1
- Dynamic 2.

It is suggested you use clearly identifiable tag names/descriptions when you create the Group Addresses. Suitable Groups for the example MRA system in Figure 19 are shown in Figure 20.

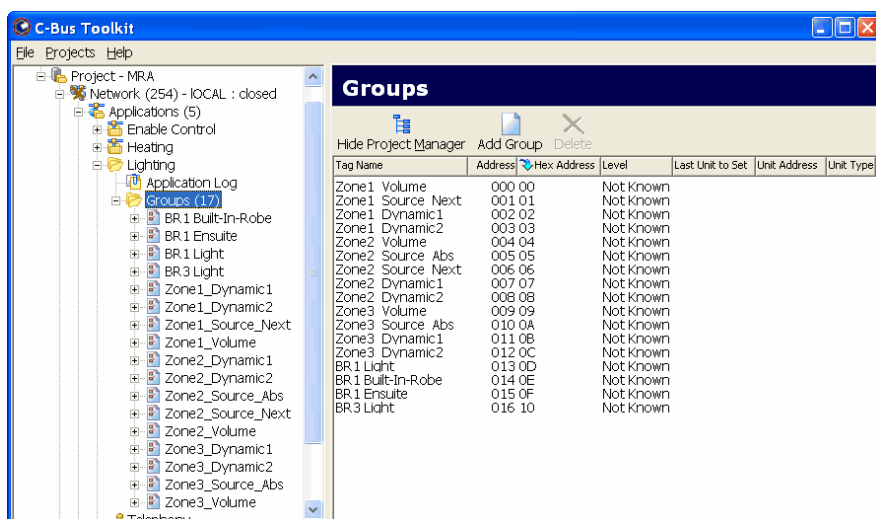


Figure 20 – Group Addresses used in the example MRA system

- 4) A button on a wall switch can be used to select a specific audio source (absolute source). This is normally achieved by configuring the button as a scene. If you program a C-Bus DLT wall switch to select an absolute source, you must create a Group Address in the Trigger Control Application and an Action Selector (selector) for each scene. These allow you to send labels to the DLT scenes. Such a Trigger Control Group Address with selectors is shown in Figure 21.

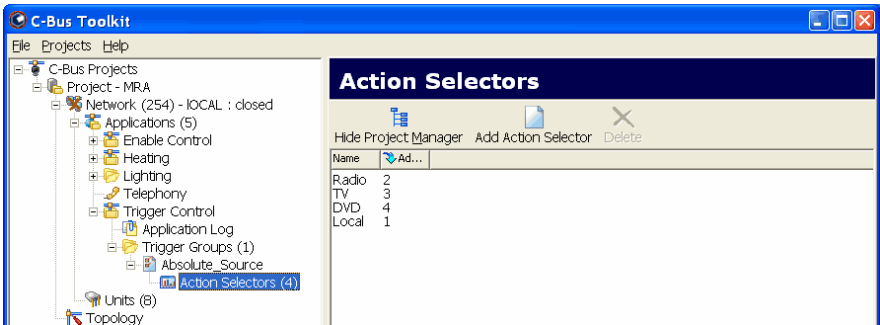


Figure 21 – Selectors used in DLT scenes for absolute source selection

- 5) Two dynamic control buttons can be used on a wall switch to perform different functions depending on which source is selected. If you use dynamic control buttons you must create a Group Address in the Trigger Control Application and a selector for each function. These selectors are used when configuring the Matrix Switcher with the MARPA software. A Trigger Control Group Address with selectors used in the example MRA system is shown in Figure 22.

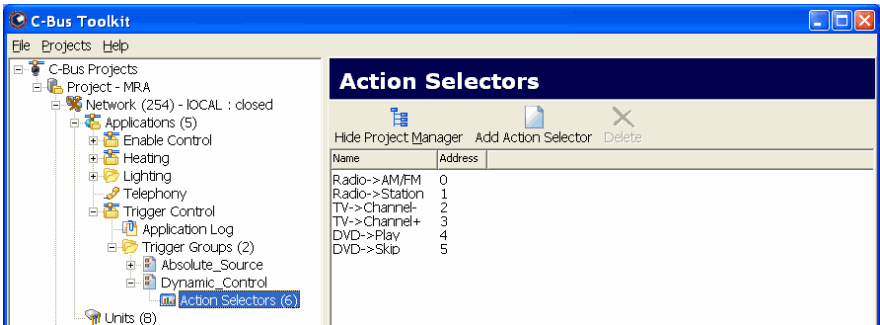


Figure 22 – Selectors used for the dynamic control functions

- 6) Select the Units branch of the C-Bus Toolkit tree view and add the C-Bus units to the network. Figure 23 shows C-Bus Toolkit after adding the units used in the example MRA system. Added units consist of:

- 1 × MRA Matrix Switcher
- 3 × MRA Amplifiers
- 3 × C-Bus wall switches
- 1 × DIN Rail Dimmer.

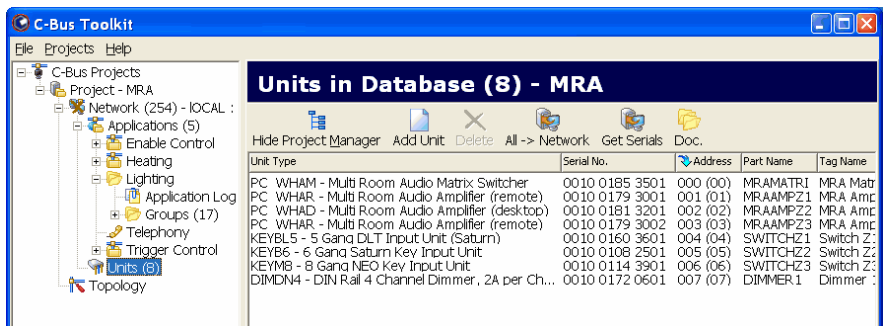


Figure 23 – Units added to the network in the MRA project

- 7) Configure the Matrix Switcher unit (if necessary). The Matrix Switcher needs to be configured in Toolkit only to enable its C-Bus system clock or network burden. In a C-Bus network consisting entirely of MRA devices, or where the Matrix Switcher is the only unit with a C-Bus power supply, it is recommended that you enable the Matrix Switcher's C-Bus system clock and burden. This is shown in Figure 24.

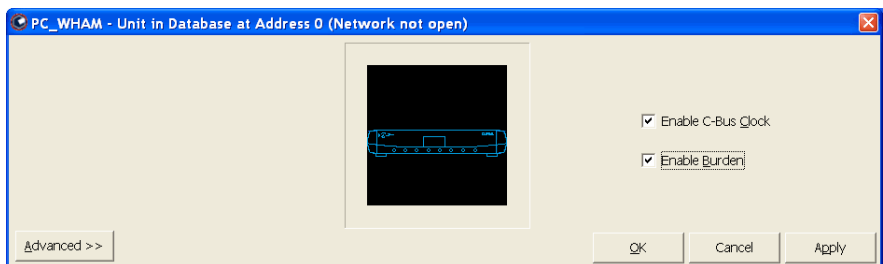


Figure 24 – Enable the Matrix Switcher's C-Bus clock and burden

- 8) Configure the Amplifiers. In a typical MRA system such as in Figure 19 the default settings on the Audio Levels and Zoning tabs are sufficient. The Remote tab (Desktop Amplifier) is configured by default to use the remote control supplied with the Desktop Amplifier. The C-Bus Control tab must be configured in order to control an Amplifier from a C-Bus wall switch. Select the Application first. Then specify which Group Addresses will be used to control the Volume, Bass and Treble, the Next, Previous and Absolute Sources, and the Dynamic controls. Use the Group Addresses you created in Step 3.
- Figures 25 to 27 show the configurations for the Amplifiers in the example MRA system.

Unit Identification: C-Bus Control | Audio Levels | Zoning | C-Bus Status

Control MRA devices from the specified Application

Application: Lighting

Audio Control

Volume: Zone1_Volume

Bass: <Unused>

Treble: <Unused>

More...

Source/Dynamic Control Groups

Next Source: Zone1_Source_Next

Prev Source: <Unused>

Absolute: <Unused>

Dynamic 1: Zone1_Dynamic1

Dynamic 2: Zone1_Dynamic2

Parameters

WARNING: Do not use any Group addresses within this amplifier that are already used in other amplifiers or output units in the same C-Bus installation. Otherwise unpredictable operation may occur.

Simple << OK Cancel Apply

Figure 25 – The C-Bus Control tab for the Zone 1 Remote Amplifier

Unit Identification: C-Bus Control | Audio Levels | Remote | Zoning | C-Bus Status

Control MRA devices from the specified Application

Application: Lighting

Audio Control

Volume: Zone2_Volume

Bass: <Unused>

Treble: <Unused>

More...

Source/Dynamic Control Groups

Next Source: Zone2_Source_Next

Prev Source: <Unused>

Absolute: Zone2_Source_Abs

Dynamic 1: Zone2_Dynamic1

Dynamic 2: Zone2_Dynamic2

Parameters

WARNING: Do not use any Group addresses within this amplifier that are already used in other amplifiers or output units in the same C-Bus installation. Otherwise unpredictable operation may occur.

Confirm - 4450

Please confirm the following

Necessary Levels representing Absolute Source parameters do not exist within the selected C-Bus Group. Create missing Levels?

Yes No

Absolute Source Levels

Level	Source	Tag Name
1%	Local Input	Local Input
2%	Analogue Source 1	Analogue Source 1
3%	Analogue Source 2	Analogue Source 2
4%	Analogue Source 3	Analogue Source 3
5%	Analogue Source 4	Analogue Source 4
6%	Digital	Digital
7%	Optical	Optical

Group address: 5 Group name: Zone2_Source_Ana1

Default OK Cancel

Figure 26 – The C-Bus Control tab for the Zone 2 Desktop Amplifier

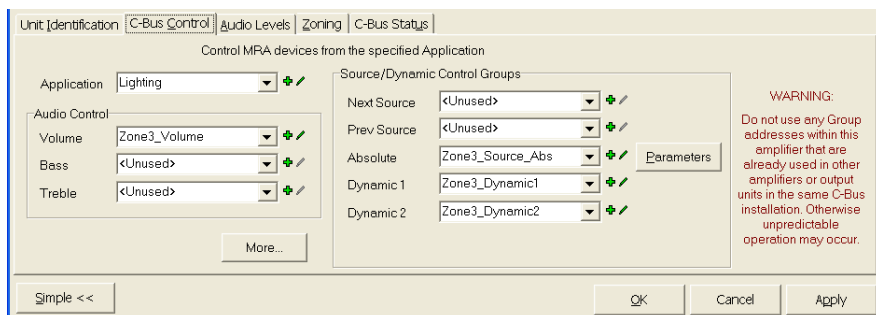


Figure 27 – The C-Bus Control tab for the Zone 3 Remote Amplifier



NOTE

The Absolute source is used to select a specific audio source, such as Analogue Source 1 or Local Input. It consists of a Group Address and a selector (level). When selecting an Absolute Group Address, you are asked if you want to create levels for the selected Group Address. After responding with Yes, you can click the Parameters button to see which levels are used to select specific audio sources. This is shown in Figure 26. The same levels are always used for the respective sources.

- 9) Configure the wall switches. For most control functions you simply select the Group Address and function type. It is recommended you use the following functions:
 - Bell Press for Next and Previous Source
 - On/Off for Dynamic control
 - Scene for Absolute Source selection
 - Dimmer for a single Volume button, Dimmer Down/Dimmer Up for a pair of Volume buttons
 - Dimmer for a single, or Dimmer Down/Dimmer Up for a pair of Bass or Treble buttons. Use a short release recall level of 50% so that a quick-press sets the bass or treble to mid range. Do this via the Key Function and Blocks tabs (refer to Figure 28).

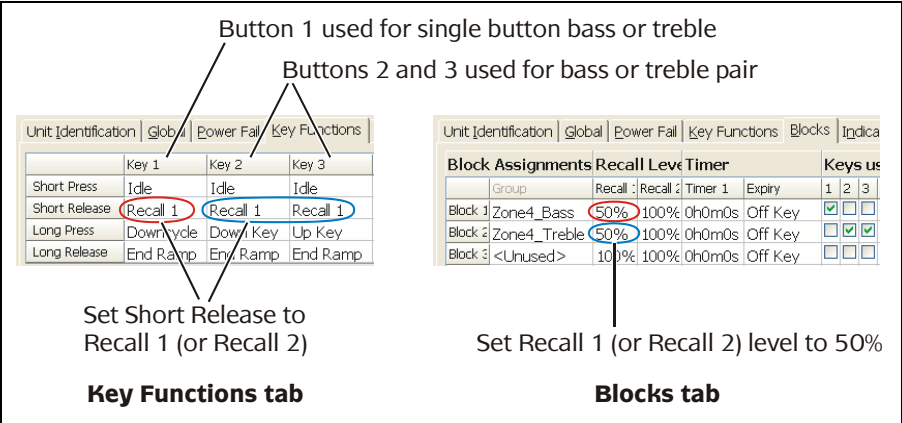


Figure 28 – Setting short release recall levels for bass and treble buttons

Figure 29 shows configuration of the C-Bus DLT wall switch used in Zone 1 of the MRA example system.

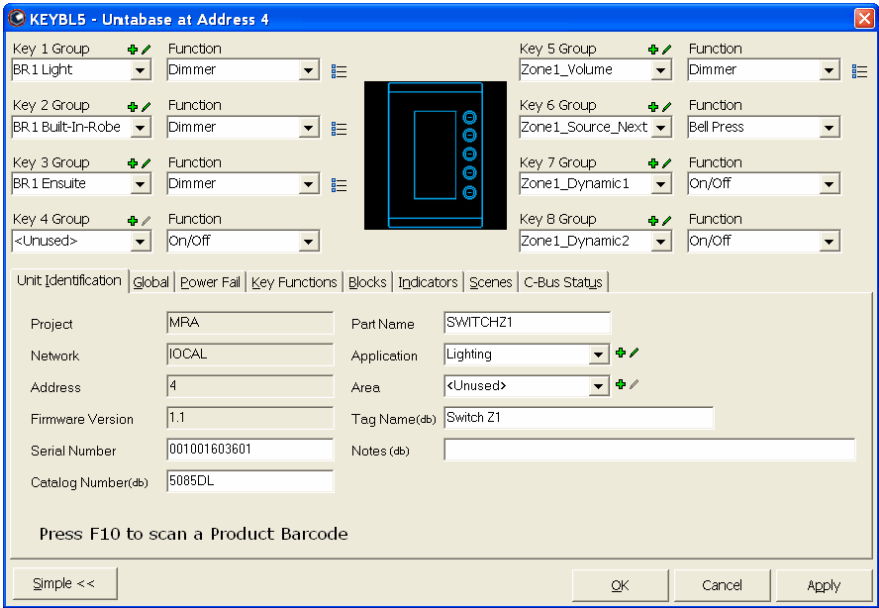



Figure 29 – Configuring the C-Bus DLT wall switch for Zone 1

Absolute Source selection is a little more complicated, as it is best performed using a scene. To configure a button that selects an absolute source using a scene:

- i) Select the Scene function for the button. (Note that a button is referred to as a key in some versions of Toolkit).
- ii) Click the  Properties button next to the Function. This brings up the “Define a Scene” panel. If you are using a C-Bus DLT wall switch, you must select a Trigger Group and Trigger Group Action Selector on this panel so you can send labels to the DLT later. Use the Group Address and selector(s) you created in Step 4. An example is provided in Figure 30.
- iii) Click the Edit Scenes button to bring up the Scene Manager. Select the Group Address used for Absolute Source selection (from the list on the right hand side), and click the “<” button to add it to the list of Commands. Type the level which corresponds to the relevant source, in the box next to the slider. Absolute source levels can be seen in Figure 26.

Figures 31 and 32 show the configuration of the Ulti Saturn wall switch used in Zone 2 of the MRA example system.

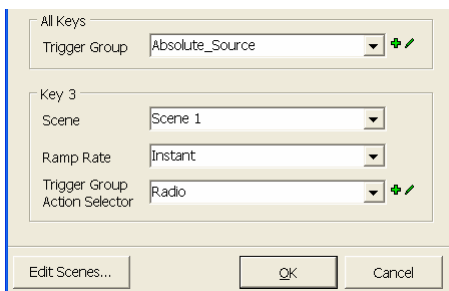


Figure 30 – Defining a scene on a DLT

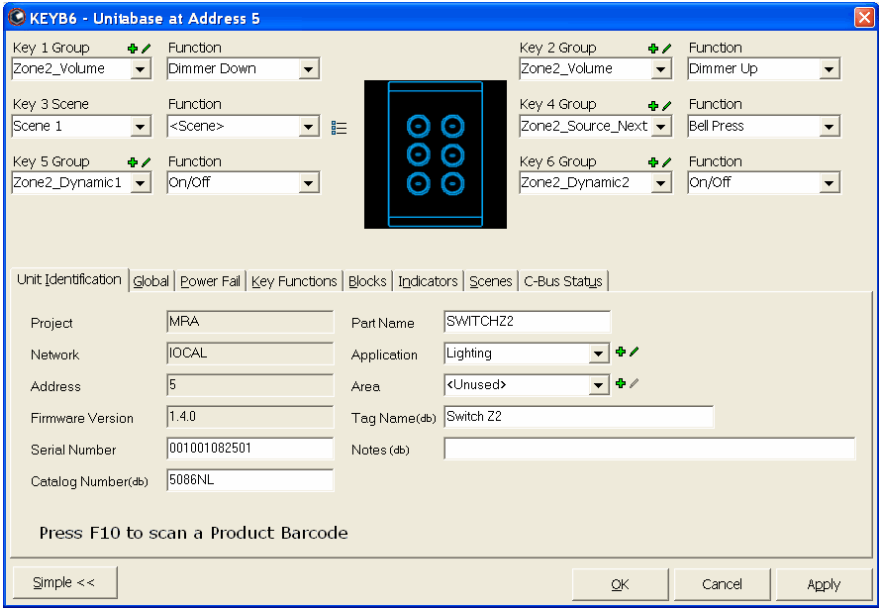


Figure 31 – Configuring the Ulti Saturn wall switch for Zone 2

If a wall switch is programmed with one or more absolute source buttons as well as a next/previous source button, add the next/previous source Group Address(es) to the scene used for absolute source selection. This will force the scene button's indicator to switch off when the next or previous source button is selected. This is shown in Figure 32.

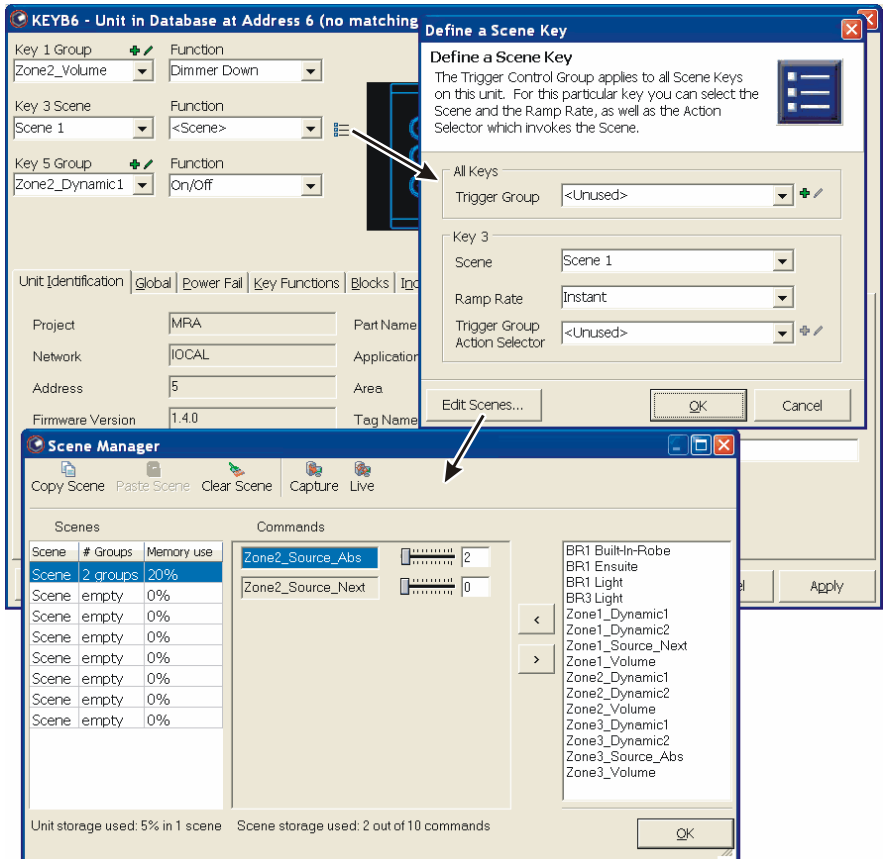


Figure 32 – Configuring a button for absolute source selection for Zone 2

Figures 33 to 36 show the configuration of the Neo wall switch used in Zone 3 of the MRA example system.

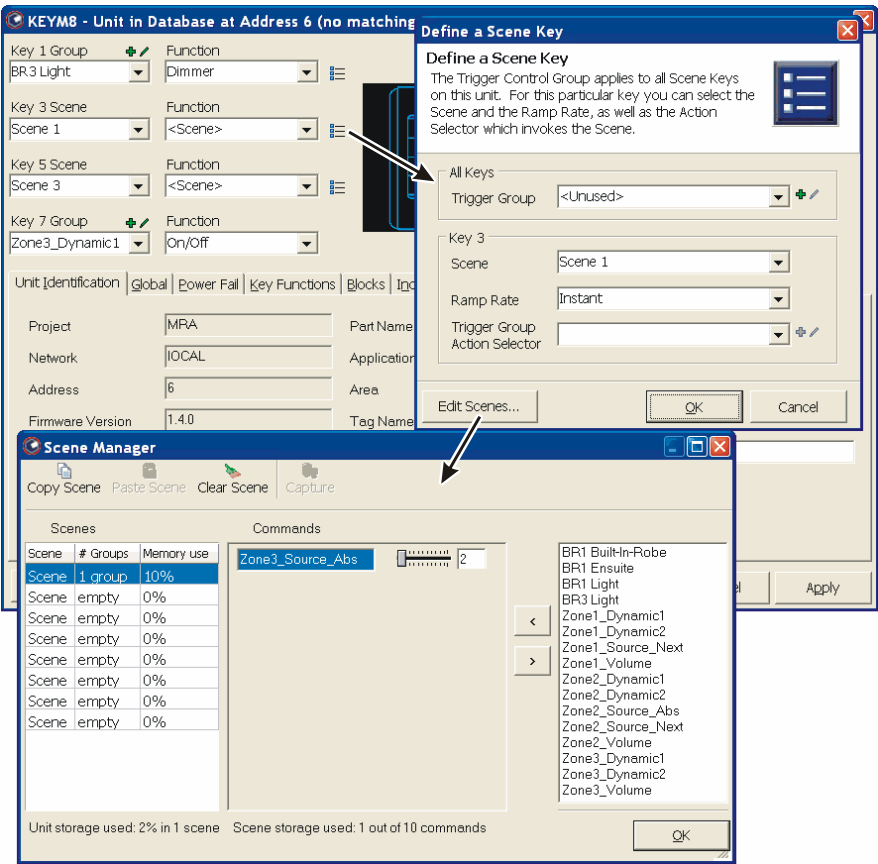


Figure 33 – Configuring the Neo wall switch for Zone 3 (showing Scene 1)

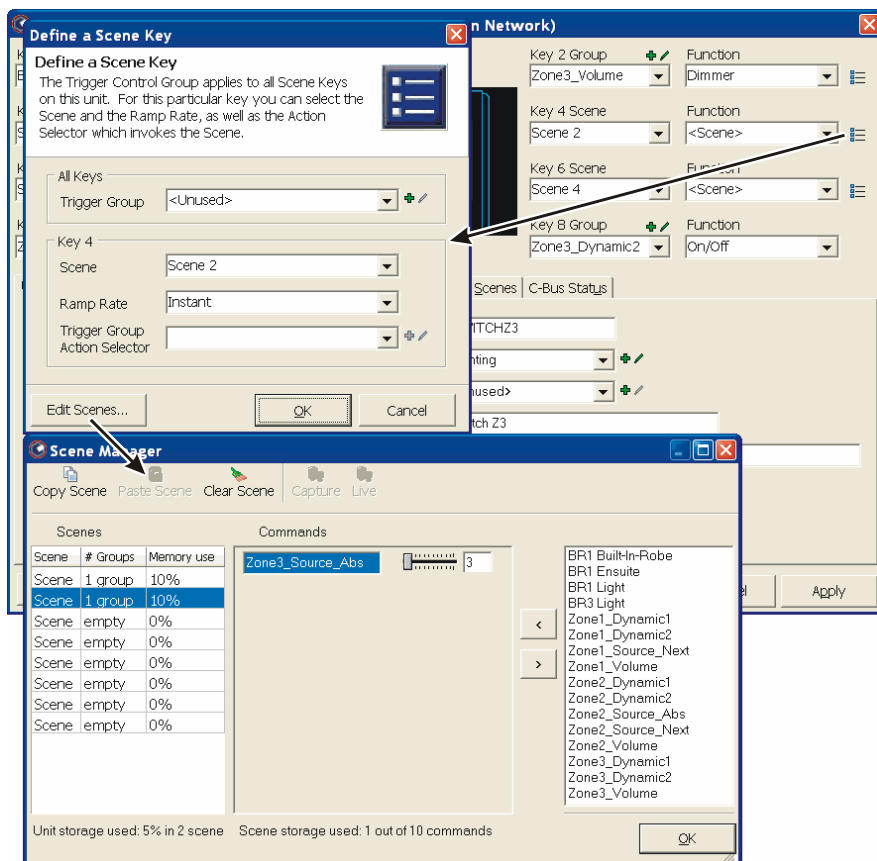


Figure 34 – Configuring the Neo wall switch for Zone 3 (showing Scene 2)

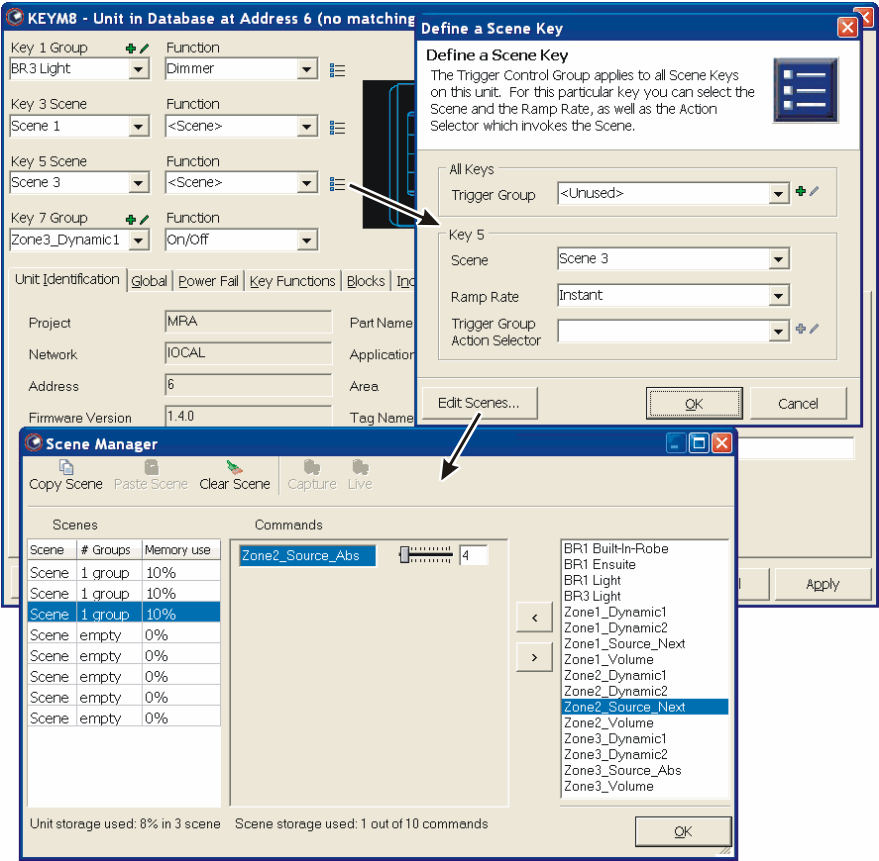


Figure 35 – Configuring the Neo wall switch for Zone 3 (showing Scene 3)

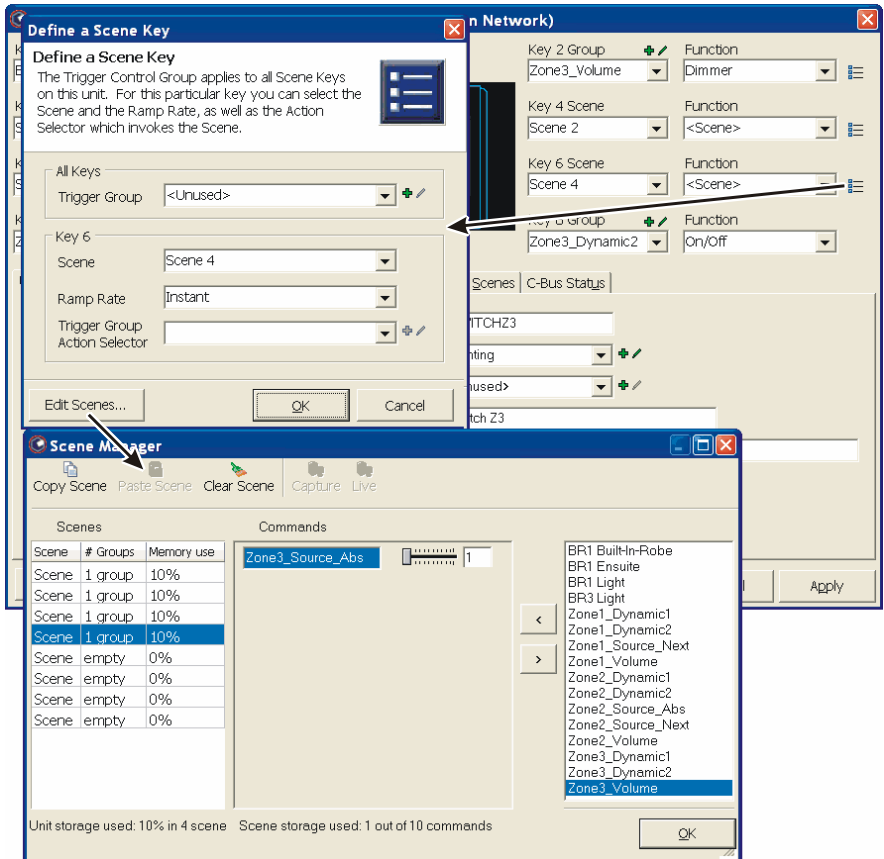


Figure 36 – Configuring the Neo wall switch for Zone 3 (showing Scene 4)

- 9) Configure any additional C-Bus units. Figure 37 shows the configuration of the 4 Channel Dimmer used in the example MRA system.

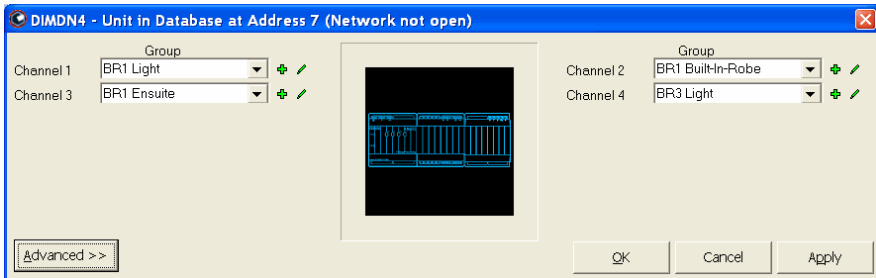


Figure 37 – Configuring the 4 Channel Dimmer in the example MRA system

- 10) Connect your PC to the C-Bus network in the usual way and open the network (right click on the Network branch in the tree and select Open Network). Scan the units in from the live network (click the Units branch of the tree and then click the Scan Network button).

Use the “All -> Network” button to transfer the information from the units in the database to the units on the C-Bus network.

Multiple Amplifiers in the Same Zone

You can connect multiple Amplifiers to the same zone. The Digital Input of the first Amplifier in the zone is connected to the Digital Output of the Matrix Switcher (or Distribution Unit). The Digital Output of the first Amplifier is connected to the Digital Input of the next Amplifier and so on, so that each Amplifier is connected to the previous in series.

When configuring Amplifiers connected in this way, set one Amplifier as a Master and all others as Slaves (on the Audio Levels tab). It is recommended you set a Desktop Amplifier as the Master if the zone includes any Amplifiers of this type.

Amplifiers in Standalone Mode

When Amplifiers are connected in standalone mode (using a Distribution Unit instead of a Matrix Switcher), the zone number must be manually configured for each Amplifier. This is done on the Zoning tab, shown in Figure 38.

For the Amplifiers used in the standalone configuration in Figure 3 (Page 8), the first Amplifier would be set to Zone 1, the second to Zone 2 and the third to Zone 3. All Amplifiers connected in the same standalone installation must be set to the same Matrix Switcher number.

The screenshot shows a software window with several tabs: 'Unit Identification', 'C-Bus Control', 'Audio Levels', 'Zoning' (which is selected), and 'C-Bus Status'. The 'Zoning' tab contains the following elements:

- A checkbox labeled 'Use Matrix Switcher auto assigned zone' which is currently unchecked.
- A section titled 'Programmable Zone' containing two dropdown menus: 'Matrix Switcher No' set to '1' and 'Zone No' set to '2'.
- A section titled 'Currently Active Zone' containing two input fields: 'Matrix Switcher No' and 'Zone No', both of which are empty. To the right of these fields is an 'Update' button.
- Below the 'Currently Active Zone' section, the text 'Parameters are assigned automatically by the Matrix Switcher' is displayed.
- At the bottom of the window, there are four buttons: 'Simple <<', 'OK', 'Cancel', and 'Apply'.

Figure 38 – Setting the zone number of a standalone Amplifier

10.2 MARPA

The Matrix Switcher needs to be programmed with the Multi Room Audio Rapid Programming Application (MARPA). Use this application to:

- assign an ID to the Matrix Switcher (in case multiple Matrix Switchers are used on the same network of a C-Bus installation)
- configure parameters for each audio source, such as,
 - the label (description) displayed when the source is selected
 - the gain/attenuation
 - whether the source is available
 - which C-Bus commands are triggered by the Dynamic controls
- configure parameters for each zone, including,
 - the label (description) displayed when the zone is selected
 - whether labels are sent to C-Bus DLT switches
 - whether the local input source is available
- configure IR maps for dynamic control (if used).

1) Start MARPA and choose the Create New Project action (Figure 39).

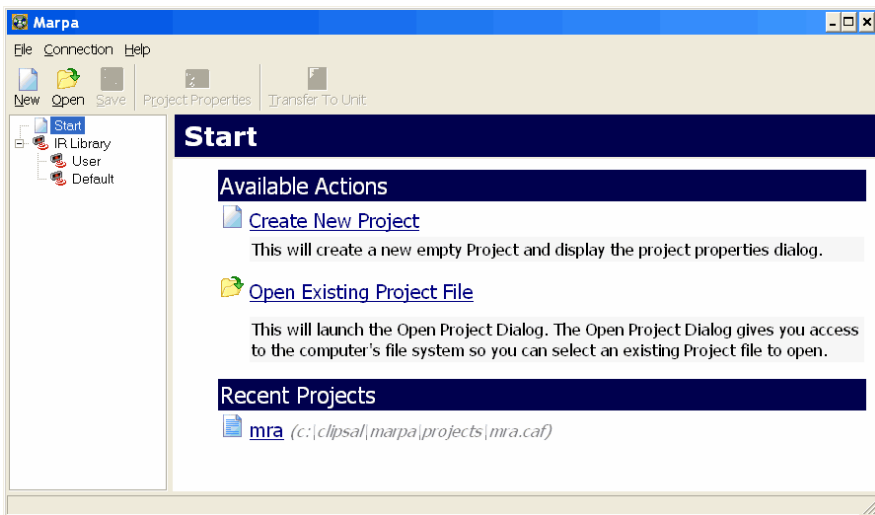


Figure 39 – The MARPA start-up window

- 2) Select the C-Bus project you created in Toolkit, then select the network (Figure 40). Click OK.

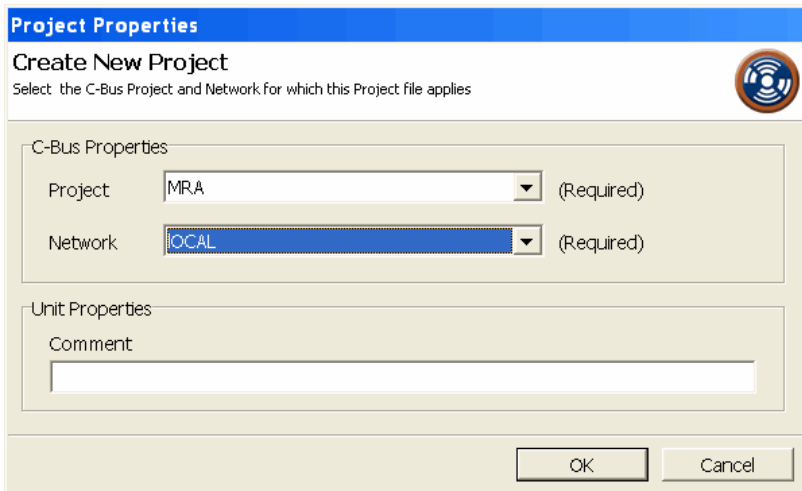


Figure 40 – Selecting the C-Bus project and network

- 3) The General branch of the Project tree is selected. The default settings on this branch are suitable for a typical single Matrix Switcher system such as the example MRA system. If you have multiple Matrix Switchers on the same C-Bus network (you can have up to three), you need to give each one a unique number.

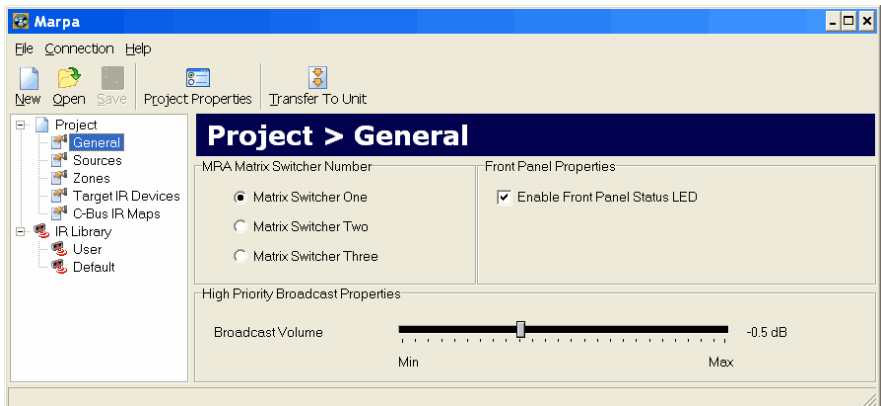


Figure 41 – MARPA's General branch

- 4) Select the Sources branch of the Project tree. The Local source tab is selected (Figure 42). The Description of the Local source can be changed here. Its default is “Local”. The Description is displayed on the Matrix Switcher LCD when the source is selected. It is also displayed as the label for the source selection control group on a C-Bus DLT wall switch if DLT labelling is enabled.

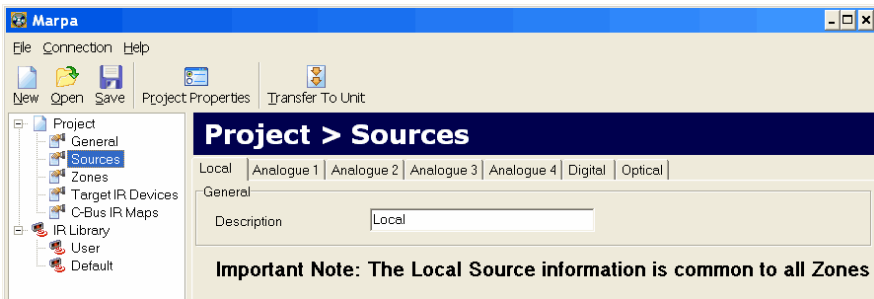


Figure 42 – The Local tab of MARPA's Sources branch

- 5) In turn, select each of the six distributable sources (Analogue 1 to Optical), and:
- disable the “Include this source in “Next” and “Previous” navigation cycle” checkbox if the source will be unused
 - enter the Description (if the source will be used)
 - enter the Description for the Dynamic 1 and 2 controls (if used)
 - select the Trigger Group and Selector for the Dynamic 1 and Dynamic 2 control (if used).

The Analogue 1, 2 and 3 tabs shown in Figures 43 to 45 are configured for the example MRA system shown in Figure 19. Since the Analogue 4, Digital and Optical source inputs are not used in the example system, the “Include this source in “Next” and “Previous” navigation cycle” checkbox is disabled in their respective tabs, as shown in Figure 46.

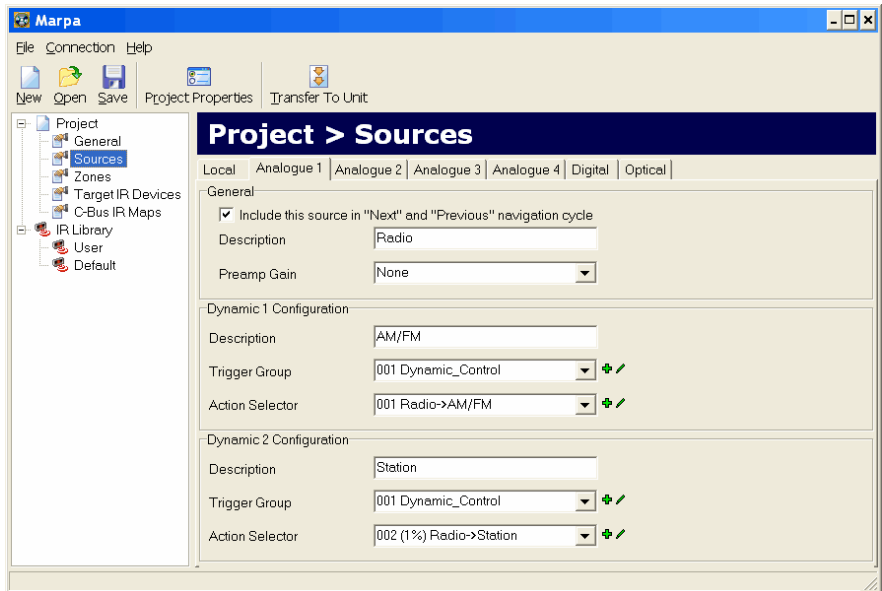


Figure 43 – The Analogue 1 tab configured for the example MRA system

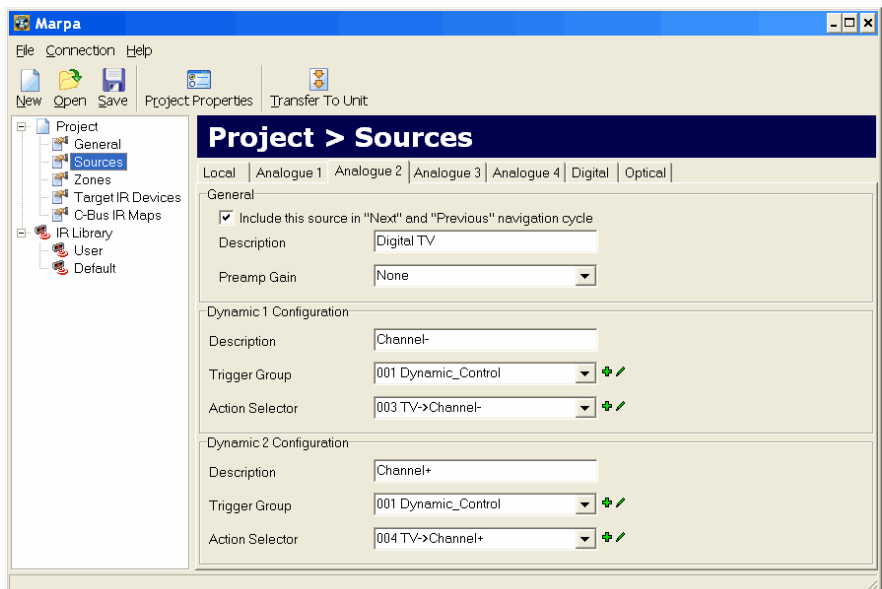


Figure 44 – The Analogue 2 tab configured for the example MRA system

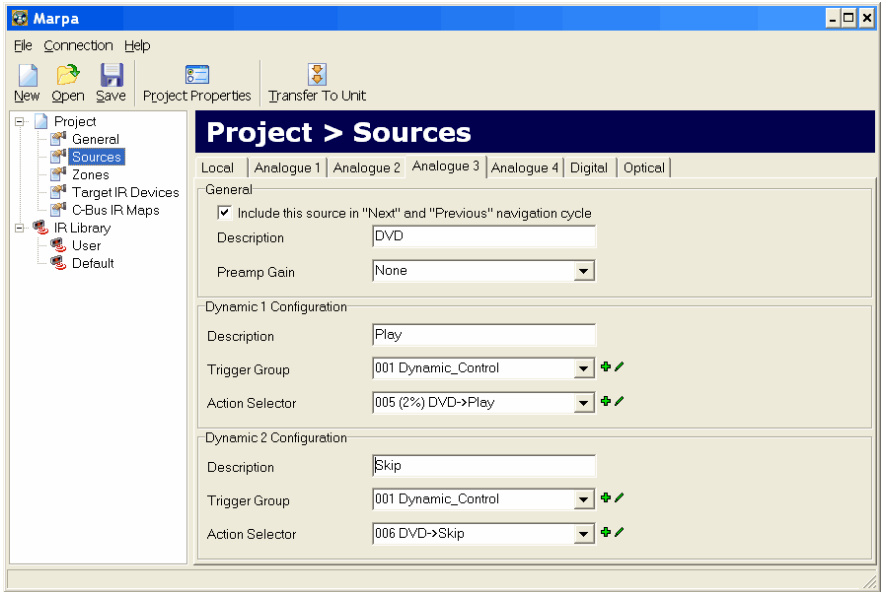


Figure 45 – The Analogue 3 tab configured for the example MRA system

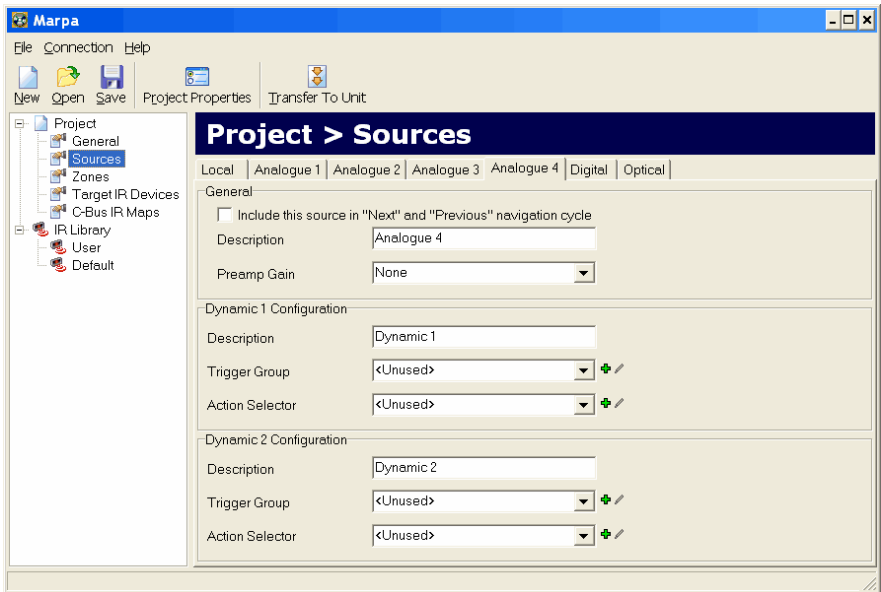


Figure 46 – The Analogue 4 tab configured for an unused source

- 6) Select the Zones branch of the Project tree. Select each Zone tab that corresponds to a zone used in the MRA system. On each:
- enable the “Generate DLT Labels” checkbox if any C-Bus DLT switches exist in the zone
 - enable the Local Source checkbox if a local input may be used in an Amplifier in the zone
 - enter the Description (displayed on the Matrix Switcher LCD when a zone selection button is pressed).

Figures 47 and 48 show the Zone 1 and Zone 2 tabs configured for the example MRA system shown in Figure 19. Since a C-Bus DLT wall switch exists in zone 1 only, the Zone 1 tab has its “Generate DLT Labels” checkbox enabled, but the Zone 2 tab does not.

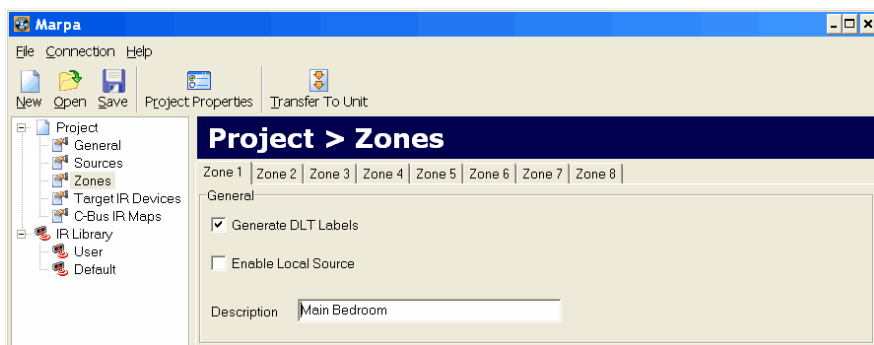


Figure 47 – The Zone 1 tab configured for the example MRA system

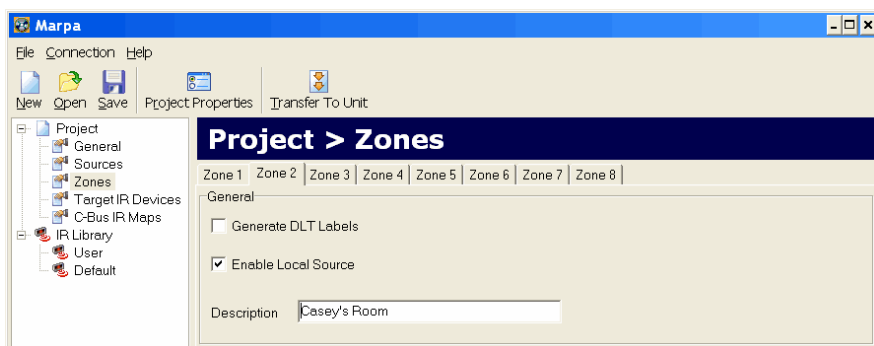


Figure 48 – The Zone 2 tab configured for the example MRA system

Mapping IR Codes to the Dynamic Controls

It is recommended you import the IR codes specific to the devices you will be controlling. IR codes can be obtained using the Clipsal IR Code Learning Unit (Catalogue Number 5100RP) and the IR Reader Software. Together these products learn the codes from an Infrared Control and output them in XML format.

- 7) Select the User branch of the IR Library tree. Unless the device is already present in the list, click the Import button and select and open the IR Reader file to be imported. Select the device in the list (if not already selected) and click the Add to Project button. Figure 49 shows an example device selected in the User branch of the IR Library.

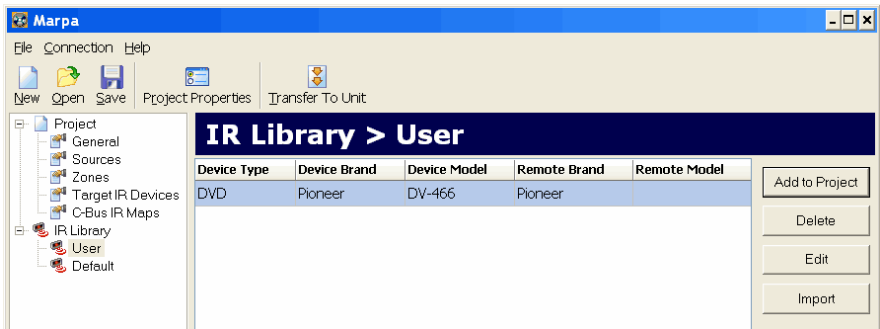


Figure 49 – A device selected in the User branch of the IR Library

- 8) Select the C-Bus IR Maps branch of the Project tree. This is where you map the IR codes to selectors in Trigger Control Group Addresses.
 - i) Click the Add button to bring up the “Add C-Bus IR Map to Project” panel.
 - ii) In the left hand window, click on the [+] next to the Trigger Control branch to expand the tree.
 - iii) Click on the [+] next to the Dynamic_Control group you created in Toolkit, to reveal the selectors.
 - iv) In the right hand window, expand the IR code tree to reveal the commands.
 - v) For each selector on the left, click the IR command on the right and while continuing to hold down the mouse, drag the command across to the selector.

Figure 50 shows how to map a remote command to a selector used for dynamic control. After dropping a remote command on a selector, you are prompted to select which channel or channels the IR command is to be output on. These are the physical “IR Out” emitter connectors on the rear of the Matrix Switcher.



Figure 50 – Mapping IR codes to Dynamic controls

9) Click the Save button (Figure 51) to save the MARPA project.

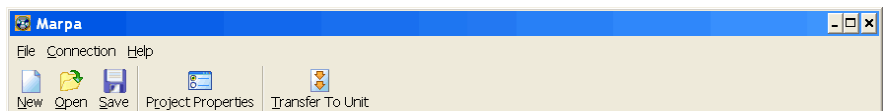


Figure 51 – Buttons on the MARPA tool bar

- 10) Transfer the project to the Matrix Switcher. To do this:
- Ensure power is connected to the Matrix Switcher and the unit is switched on. A power switch is located on the rear of the Matrix Switcher, next to the AC power socket.
 - Use the supplied USB cable (1 m Type A to Type B). Do not extend its length or substitute it for a longer cable. Plug one end into your PC and the other into the rear of the Matrix Switcher.
 - Wait about 30 seconds for the driver to respond. If this is the first time you have connected the Matrix Switcher to your PC via the USB, and depending on which operating system you are using, you may be prompted to install driver software ("Found New Hardware"). If so, proceed with the recommended automatic option.
 - Click the "Transfer to Unit" button in MARPA (Figure 51).
 - Select the COM port used by the USB cable. This is likely to be the one with the highest number.
 - Click the Start button. A progress bar is displayed as the project is transferred (Figure 52). The project may take one or two minutes to transfer. If a Communications Failure message is displayed, select a different COM port and try again.

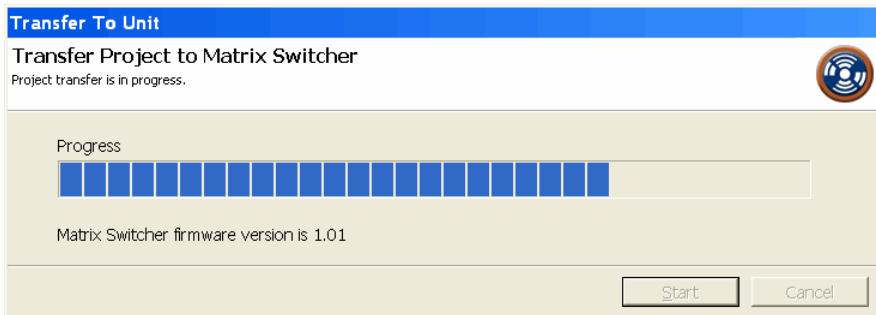


Figure 52 – A progress bar is displayed as the project is transferred

11.0 Unit Connections

11.1 Distribution Unit

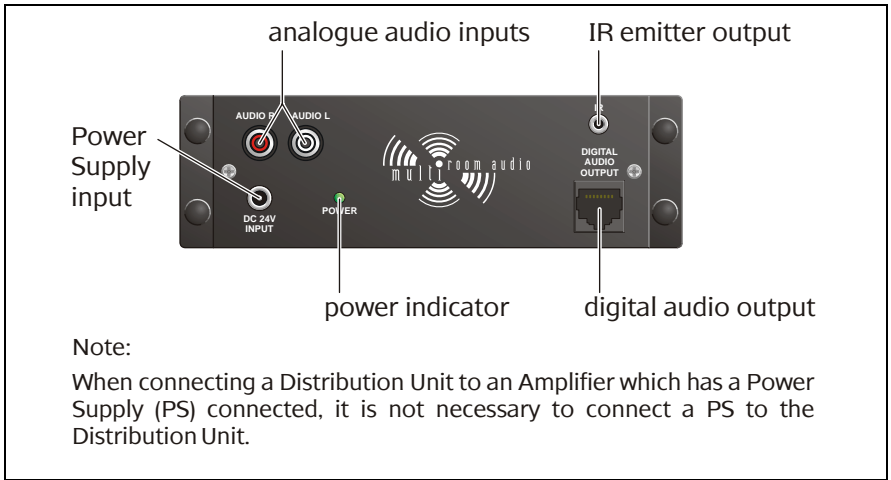


Figure 53 – Distribution Unit connections and indicator

Connection /Indicator	Description
Analogue audio inputs	The line level stereo analogue audio connection.
IR emitter output	This 3.5 mm socket connects to an IR Emitter Lead. IR Emitters can be coupled to IR receivers on equipment, providing remote control from any zone through the Multi Room Audio system.
Power Supply input	The 24 V DC Distribution Unit Power Supply connection. This is used when connecting the Distribution Unit to a Matrix Switcher. The Power Supply not required when the digital audio output is connected to the digital audio input of an Amplifier.

Connection /Indicator	Description
Power indicator	Indicates that power is connected to the unit.
Digital Audio Output	This RJ45 connection outputs the digital audio which has been converted from the analogue input. This connects to a digital input on the Matrix Switcher or Amplifier.

11.2 Amplifiers

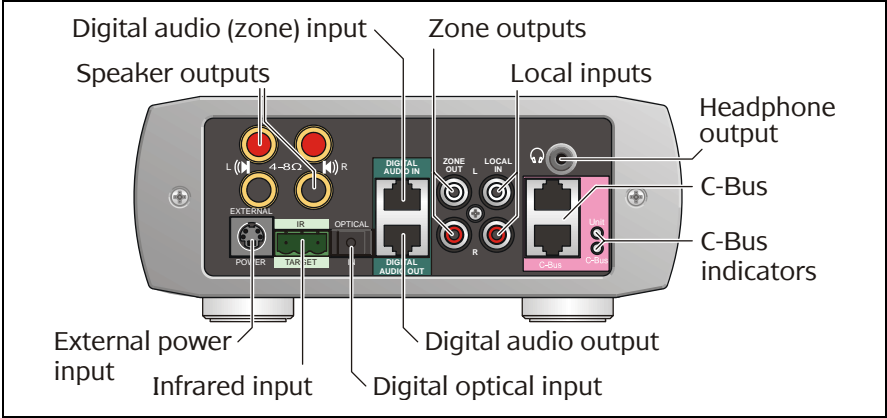


Figure 54 – Desktop Amplifier rear panel connections and indicators

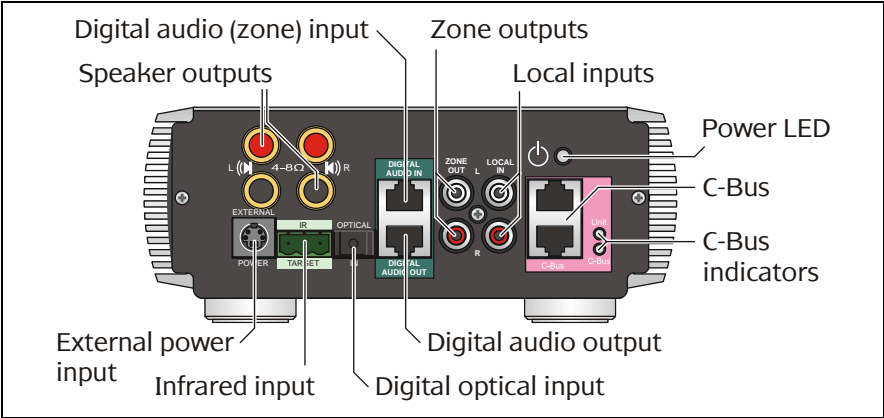


Figure 55 – Remote Amplifier rear panel connections and indicators

Connection /Indicator	Description
Speaker outputs	These are used to connect to 4 Ω to 8 Ω speakers which are rated at 25 W RMS @ 4 Ω (or 6 W RMS @ 4 Ω if no external power supply is connected to the Amplifier).
Digital audio (zone) input	The zone output of the Matrix Switcher is connected to this input. Alternatively a Multi Room Audio Distribution Unit can be connected to this input, providing one stereo audio input. In this mode, the Amplifier can select between two audio sources: Digital audio input and local input.
Zone outputs (1 \times RCA pair)	These are line level outputs of the selected audio source as received by the Amplifier. The outputs are affected by the volume, bass and treble settings of the Amplifier.
Local inputs (1 \times RCA pair)	Use this to Connect a local analogue audio source which is available to this Amplifier only.

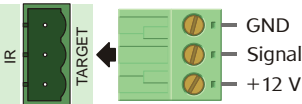
Connection /Indicator	Description
External power input	<p>This provides power to the Amplifier (when a Matrix Switcher is not used). An external power supply also increases the Amplifier's audio output capacity to 25 W RMS into 4 ohm speakers.</p> <p>Power supply rating: 24 V DC, 3.75 A or 21 V AC, 3.5 A.</p>
Infrared input	<p>This Phoenix socket connects to an IR Target, allowing an infrared remote to control equipment located near the Matrix Switcher.</p> 
Digital optical input	<p>Use this to connect a digital optical audio source to the Amplifier instead of the digital audio (zone) source. The digital audio format must be 44.1 or 48 kHz stereo. Some digital audio formats (such as surround sound) are not compatible with the Amplifier. Either a digital audio (zone) or digital optical audio source may be connected to the Amplifier, but not both simultaneously.</p>
Digital audio output	<p>This is used to connect an additional Amplifier to the same zone as this Amplifier. A Cat-5 cable is used to connect to the additional Amplifier's Digital audio (zone) input. Both Amplifiers will use the same zone (they will both select the same audio source).</p>
C-Bus (×2)	<p>Connects to the C-Bus network.</p>
C-Bus indicators	<p><u>Unit</u> On: C-Bus network connected Flashing: Data exchange in progress</p> <p><u>C-Bus</u> On: C-Bus network operational Off: Insufficient C-Bus power or clock Flashing: Insufficient C-Bus power</p>

Table 2 – Amplifier connectors and indicators

11.3 Matrix Switcher

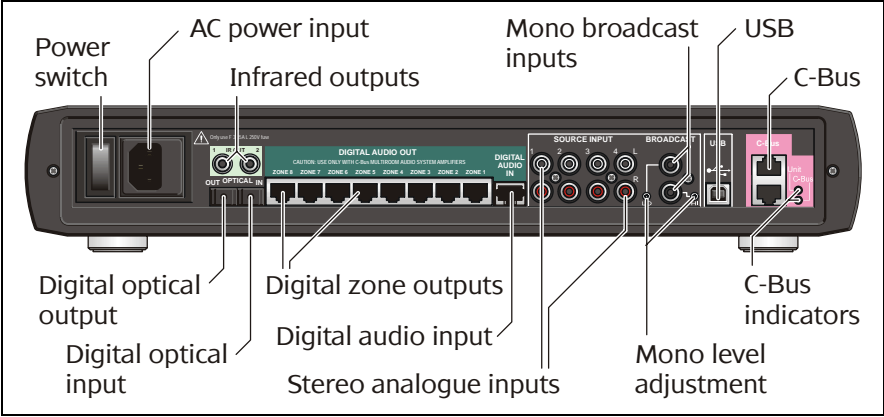


Figure 56 – Matrix Switcher rear panel connections and indicators

Connection /Indicator	Description
Power switch	Switches the mains power input on and off.
Mains power input (IEC)	Connect mains here to power the Matrix Switcher, and any connected Multi Room Audio Amplifiers which do not have an external power supply.
Infrared outputs (×2)	Use these 3.5 mm sockets to connect to IR Emitter Leads. IR Emitters can be coupled to IR receivers on equipment, providing remote control from any zone through the Multi Room Audio system.

Connection /Indicator	Description
Mono broadcast inputs (×2)	<p>Line level mono audio connected here is broadcast to all zones which have an analogue input source selected.</p> <p>There are two mono inputs with different priorities. Audio connected to the Lo input is transmitted by Amplifiers at their current level.</p> <p>Audio connected to the Hi input is transmitted at a preset level. Amplifiers which have a digital input source selected, change to the fourth analogue source so they can receive the high priority broadcast audio.</p> <p><u>Note:</u> High priority (HI) broadcast audio uses left channel speakers. Low priority (LO) broadcast audio uses right channel speakers.</p>
USB (Type B)	This is used by the installer to configure the Matrix Switcher.
C-Bus (×2)	Connects to the C-Bus network.
Digital optical output	Retransmits the data received by the digital optical input.
Digital optical input	Use this to connect a digital optical audio source to be distributed to any of the eight zones. The digital audio format must be 44.1 or 48 kHz stereo. Some digital audio formats (such as surround sound) are not compatible with the Matrix Switcher.
Digital zone outputs (×8)	Each zone output is used to connect the Matrix Switcher to one Amplifier in each zone. Additional Amplifiers can be added to a zone by connecting their Digital Audio In socket to the Digital Audio Out of an existing Amplifier.
Digital audio input	A Multi Room Audio Distribution Unit can be connected to this input, providing an additional stereo audio input.

Connection /Indicator	Description
Stereo analogue inputs (4× RCA pairs)	Connect up to four stereo analogue inputs to be distributed to any of the eight zones.
Mono level adjustment (×2)	These adjust the level of the audio source connected to the mono broadcast inputs. Use a small flat head screwdriver to rotate the control if the audio source is too quiet or loud.
C-Bus indicators	<u>Unit</u> On: C-Bus network connected Flashing: Data exchange in progress <u>C-Bus</u> On: C-Bus network operational Off: Insufficient C-Bus power or clock Flashing: Insufficient C-Bus power

Table 3 – Matrix Switcher connectors and indicators

12.0 Troubleshooting

Symptom	Possible Explanation
There is no sound after switching the Amplifier on (sound worked previously).	The volume may have been set to minimum, or the Amplifier may have been Muted (on a Desktop Amplifier) before the Amplifier was switched off.
The default volume, bass or treble settings have changed (when switching the Amplifier on).	If a power failure occurs when the Amplifier is on, the volume, bass and treble settings are saved and become the new defaults.
A mains circuit breaker trips when Amplifiers are powered up.	This may occur if more than five Amplifier power supplies are connected to the same circuit, due to a high inrush current.
Unexpected behaviour occurs after the digital zone connections are changed.	The Amplifier's zone settings are not reset until all power is removed from the Amplifier. Alternatively use the Reset Amplifier function on the unit's C-Bus Status tab in the C-Bus Toolkit software.
The wrong Amplifier is responding to source changes.	The "Use Matrix Switcher auto assigned zone" option may not be enabled. This option is in the Amplifier's Zoning tab in the C-Bus Toolkit software. After changing the status of this option (on a live network), use the Reset Amplifier function on the C-Bus Status tab.
The Matrix Switcher no longer responds to button presses.	Switch the Matrix Switcher off for several seconds, then on. Use the power switch on the rear of the Matrix Switcher, next to the AC power socket.

Symptom	Possible Explanation
Dynamic labels don't work on a C-Bus DLT wall switch.	<p>There are several options which need to be selected for labels to function. These options are located:</p> <ul style="list-style-type: none"> · on the More panel accessed by clicking the "More...." button on the Amplifier's C-Bus Control tab in Toolkit · on the DLT wall switch's Global tab in Toolkit · on the Zones branch of the Project tree in the MARPA software.
An Amplifier switches off, particularly when the volume is loud.	If insufficient current is available for the Amplifier, it will switch itself off. This may occur if the Amplifier receives its power from a Matrix Switcher. The Amplifier may need its own external power supply unit.
An Amplifier emits a high pitched screeching sound when a particular source is selected.	This may occur if an output of an Amplifier is connected to the input of the Matrix Switcher. Such a connection should be avoided as it can cause a feedback loop.
The Matrix Switcher does not power up.	The fuse may need replacing. Fuse replacement is described in the Matrix Switcher User's Guide.
Audio is not broadcast via the Matrix Switcher's high priority (HI) broadcast input.	The level of the audio connected to the broadcast input may not be sufficient to trigger the broadcast.
Cannot hear any sound when using the optical input	The digital audio source may be connected to the optical output instead of the input (on a Matrix Switcher). Some digital audio formats (such as surround sound) are incompatible with the MRA system.

13.0 Electrical Specifications

13.1 Distribution Unit

Parameter	Description
Supply voltage	27 V DC (powered by Amplifier via digital audio connection), or 24 V DC @ 500 mA (via external power pack)
Analogue input signal level (Audio inputs)	2.8 V p-p maximum (31 k Ω)
A/D conversion	16 bit PCM
Operating temperature	10 to 40 °C (50 to 104 °F)
Operating humidity	10 to 90% RH (non-condensing)

13.2 Matrix Switcher

Parameter	Description
Supply voltage	240 V AC
Mains frequency range	47 to 53 Hz and 57 to 63 Hz
AC input impedance	47 k Ω
Power consumption	200 W maximum
C-Bus output voltage	36 V DC maximum
C-Bus output current	\leq 330 mA
Network clock and burden	Software selectable
Analogue input signal level (Source inputs)	2.8 V p-p maximum (47 k Ω)
A/D conversion	16 bit PCM
Operating temperature	10 to 40 °C (50 to 104 °F)
Operating humidity	10 to 90% RH (non-condensing)

13.3 Amplifiers

Parameter	Description
Supply Voltage	27 V DC (powered by Matrix Switcher via digital audio connection), and/or 24 V DC @ 3.75 A (via external switch mode power supply) or 21 V AC @ 3.5 A (via external linear power supply)
C-Bus supply voltage	15 to 36 V DC @ 22 mA
Power consumption	90 W maximum
Network clock and burden	Software selectable
Analogue input signal level (Local inputs)	2.8 V p-p maximum (47 k Ω)
Maximum power output	28 W RMS into 4 Ω (0.514% THD)
D/A conversion	16 bit PCM
Frequency response	40 Hz to 20 kHz (± 1 dB)
Total harmonic distortion (1 kHz, 20 W RMS into 4 Ω)	0.36% (using analogue input)
Signal to noise ratio	> 67 db (peak, unweighted)
Operating temperature	Desktop Amp.: 10 to 40 °C (50 to 104 °F) Remote Amp.: 10 to 70 °C (50 to 158 °F)
Operating humidity	10 to 90% RH (non-condensing)

13.4 System Audio Performance

Parameter	Description	
	Matrix Switcher + Amplifier*	Distribution Unit + Amplifier* [†]
Frequency response	40 Hz to 20 kHz (+2.4/-0.75 db)	40 Hz to 20 kHz (±2.3 dB)
Total harmonic distortion (1 kHz, 20 W RMS into 4 Ω)	0.16%	0.20%
Signal to noise ratio	> 63 dB (peak, unweighted)	> 63 dB (peak, unweighted)

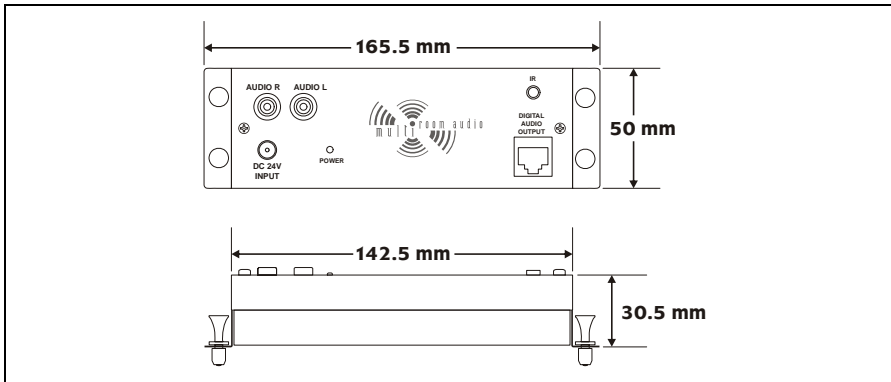
* Analogue inputs of Matrix Switcher/Distrib. Unit, measured from Amplifier speaker outputs

[†] Amplifier powered by an external switch mode power supply

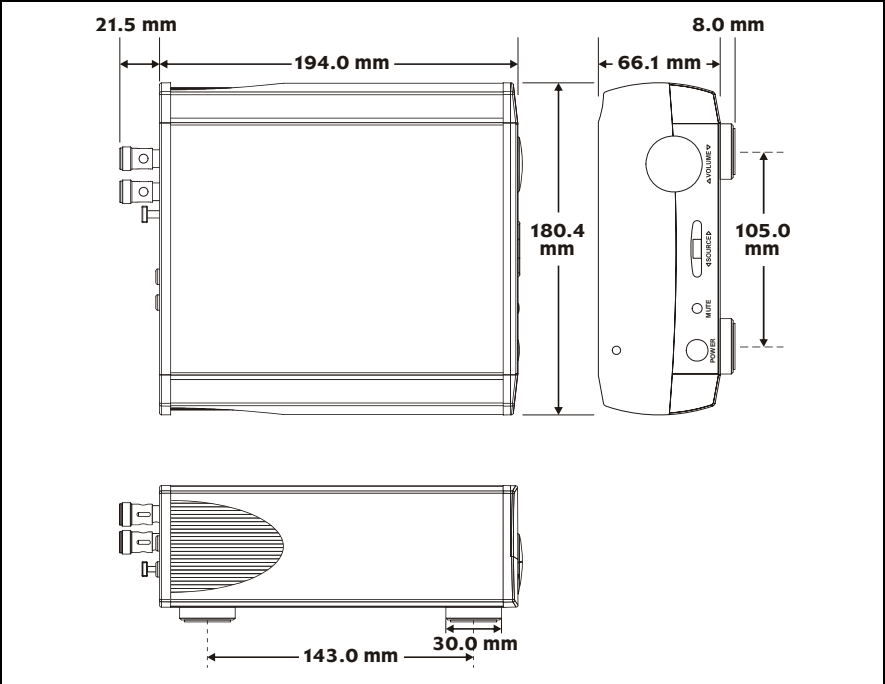
14.0 Mechanical Specifications

Unit	Weight
Distribution Unit	180 g
Desktop Amplifier	
Remote Amplifier	
Matrix Switcher	

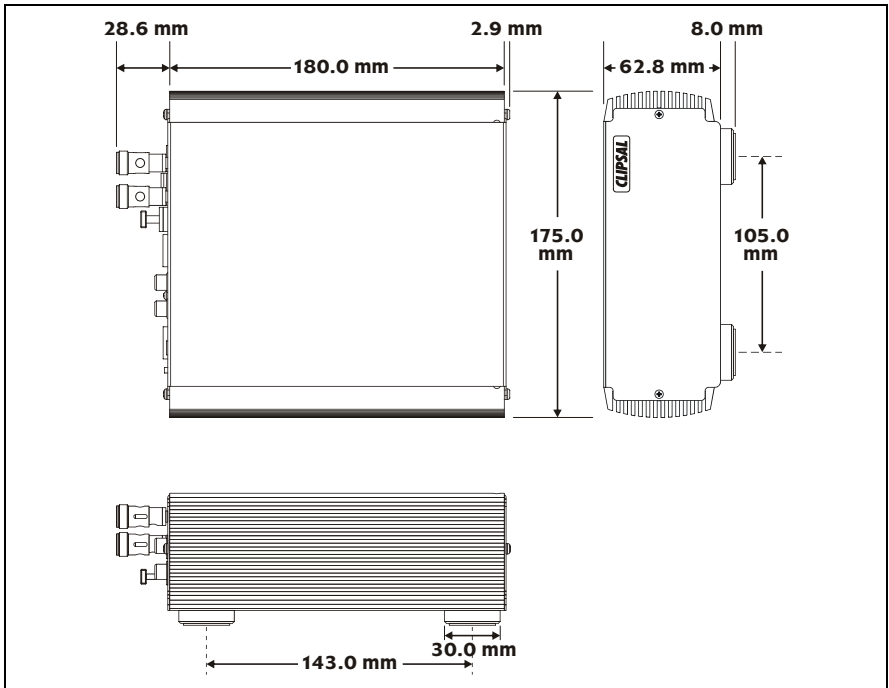
Distribution Unit



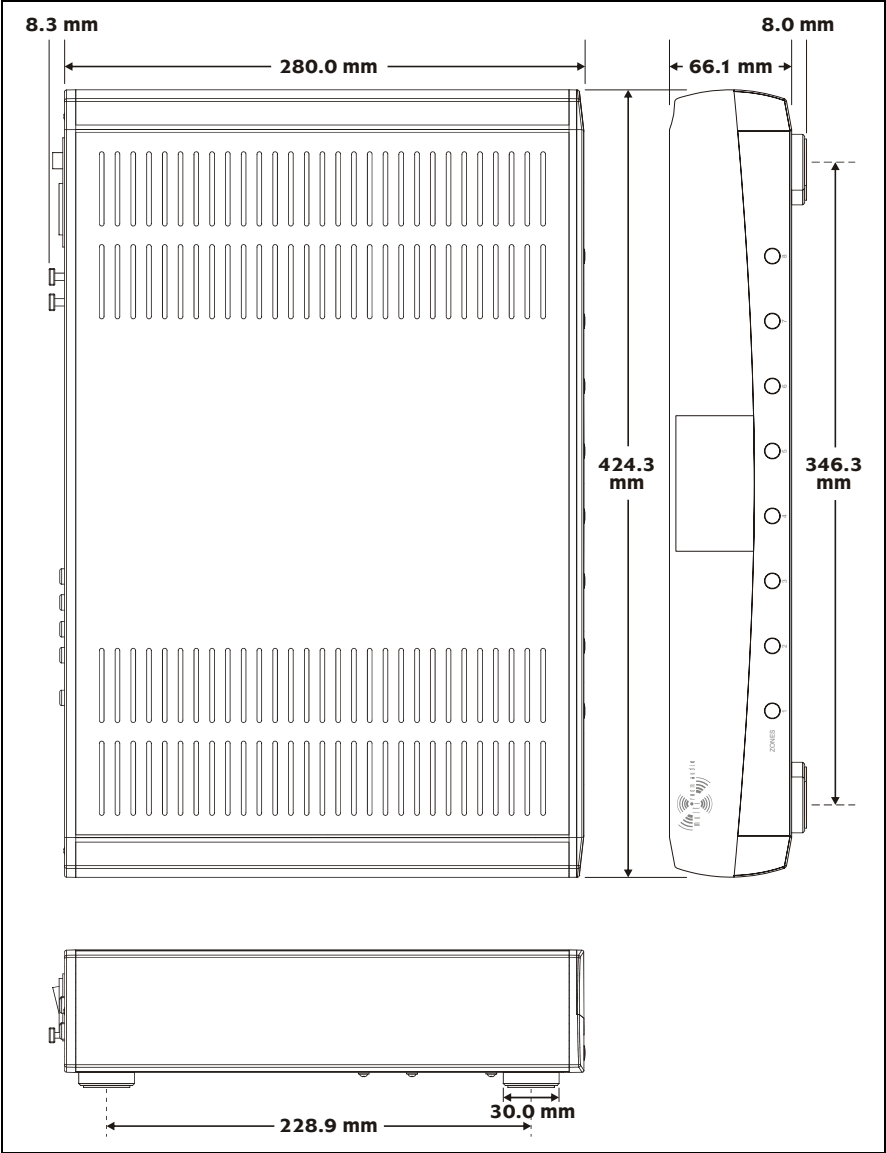
Desktop Amplifier



Remote Amplifier



Matrix Switcher



15.0 Standards Complied

DECLARATIONS OF CONFORMITY

Australian/New Zealand EMC & Electrical Safety Frameworks and Standards

The Multi Room Audio Matrix Switcher complies with the following:



Regulation	Standard	Title
Electrical Safety	AS/NZS 60065	Audio, video and similar electronic apparatus - Safety requirements
EMC (C-Tick)	AS/NZS CISPR 22	Information technology equipment - Radio disturbance characteristics (emissions)

The Multi Room Audio Amplifiers comply with the following:



Regulation	Standard	Title
Electrical Safety (When powered by PAC090M Power Supply*)	AS/NZS 60065	Audio, video and similar electronic apparatus - Safety requirements
EMC (When powered from Matrix switcher or PAC090M Power Supply*)	AS/NZS CISPR 13	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics (emissions)

* The Braemac PAC090M power supply (Clipsal Cat. Number 5600P24/3750AU) is certified to:

Safety standards

IEC 60065 and 60950, EN 60065 and 60950,
K60950, J60950(H14), CNS 13438 ,
CAN/CSA C22.2 No's. 60950-1 and 60065-03,
UL 60065 and 60950-1 (UL file 161451)

EMC standards

EN 55022, 55024, 61000-3-2 and 61000-3-3

16.0 Warranty

The Multi Room Audio Distribution Unit, Amplifiers and Matrix Switcher carry a two year warranty against manufacturing defects (refer to the Warranty Statement).



Technical Support and Troubleshooting

For further assistance in using this product, consult your nearest Clipsal Integrated Systems (CIS) Sales Representative or Technical Support Officer.

Technical Support Contact Numbers	
Australia	1300 722 247 (CIS Technical Support Hotline)
New Zealand	0800 888 219 (CIS Technical Support Hotline)

Technical Support email: techsupport.cis@clipsal.com.au

Sales support email: sales.cis@clipsal.com.au

A list of worldwide contacts, additional product information and technical resources is provided at <http://www.clipsal.com/cis/>

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